PRACTICAL CARGO STOWAGE

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IRVIN N. LARSEN

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PRACTICAL
CARGO STOWAGE
for
SHIPS' OFFICERS

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PREFACE

Several recent unfortunate maritime casualties have directed attention towards the proper **STOWAGE OF CARGO** and the vessel's **STABILITY** subsequent thereon.

The subject of cargo stowage has also received the careful attention of the Board of Trade, and the new 1931 examination syllabus for this subject has been greatly extended. The number of marks allotted for " Stowage " (the maximum) shows clearly how important " Cargo Stowage " is.

The object of this book is to provide a reasonably priced handbook for use in actual practice by officers ; and at the same time to cover the scope of the B.O.T. examinations, and thus assist officers in obtaining their Certificates.

For further information on the extensive subject of cargo stowage, the reader is referred to the author's comprehensive and exhaustive work entitled "*The Stowage of Cargo*," which is the standard work on the subject.

H. H. BRIDGER.
O. M. WATTS.

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INTRODUCTION TO

PRACTICAL CARGO STOWAGE

The apprenticeship stage of an Officer's career as a rule affords him very little opportunity to learn much about the Stowage of Cargo, except possibly during certain periods when he may be employed "watching cargo" being stowed or discharged, yet second to navigation only, this is the most important subject, or one that will affect his career more than anything else.

It must be realised that it is by the carriage of the cargo that the Ship or Shipping Company is able to maintain sound financial position, therefore it is essential that cargo is properly stowed and cared for, to avoid heavy losses by claims against the ship.

It can hardly be expected that Officers should know all about the stowage of every kind of cargo likely to be carried, but the aim should be to have a good general idea of stowage in all cases, and to be especially familiar with the fundamental principles of stowage described in this work.

It must be thoroughly understood that, although the stevedore in many cases actually loads the vessel (officers, in some trades, never supervise the loading or discharging) this does not alter the fact that **in each and every case the Master—and/or his officers deputising for him—is absolutely and completely responsible for the stowage of cargo, and, therefore, too much attention cannot be given by the Master and Officers to proper stowage.**

With all cargoes, great care and skill are necessary to stow the articles in such a way that no damage is done, either to themselves or to goods stowed adjacent to them, and that all space in the ship is utilised to the greatest advantage, having due regard to proper stowage.

The idea has been in mind to generalise, thus leading the reader to grasp the general principles of the whole subject, and in this way an officer will learn to deal better with any contingencies that may arise.

It may be of use to the young officer to appreciate the subject of Stowage of Cargo from four points of view, viz., that of the shipowner, of the shipmaster, of the merchant, and of the underwriters of the ship and cargo.

The **SHIPOWNER** must take many things into consideration when he is chartering for cargo, or placing his vessel on the berth.

He has to consider how he will make the greatest nett freight, or in other words the greatest monetary profit. For example, it would be less advantageous to charter his vessel to carry cargo at a high gross freight if the expenses and charges to load, carry and discharge the cargo were correspondingly high, than to take less freight and accept a cargo which could be stowed, carried and discharged at much less cost.

In most cases it is an advantage to carry cargo so that the vessel will be what is termed " full and down " ; that is, so that when the vessel is a full ship, she will be down, or nearly down, to her " marks," having taken into consideration the necessities of bunkering, etc., during the voyage. Consider for example a vessel of 440,000 cubic feet stowage capacity and of 10,300 tons deadweight. The tonnage required for fuel, water, stores, etc. is, say, 2,300 tons. This would mean that 8,000 tons weight of cargo could be carried in the 440,000 cubic feet space.

Hence a cargo that would stow at 55 cubic feet to the ton weight would just put that vessel " full and down," and therefore it would be to the shipowner's advantage to arrange for a cargo that would stow at about that figure.

In practice, of course, it cannot always actually be attained, but this fact should be kept in view.

At the same time due consideration must be given to the nature and condition of the cargo to be carried ; to the cost of handling, and to the after-effects of carrying the cargo. For example, if he had provided for his ship to be " full and down," it would not be to the shipowner's advantage if the particular cargo carried had to bear heavy charges for handling, or left the ship in such condition that he was put to great expense to recondition her for another cargo.

From the **SHIPMASTER'S** point of view the proper stowage and carriage of cargo is all-important. He has many things to consider.

At the present time the Master has little to do with the choice of cargo. On arrival in port he is usually informed that his ship is fixed to load a certain cargo, with possibly various options on the part of the shippers as to what goods they may or may not ship ; but the **disposition and stowage** of all cargo rests entirely with the Master and his officers.

First and foremost, he must arrange for the cargo to be stowed to prevent damage to the vessel or to other cargo ; and having received, loaded and stowed the consignment on board his vessel, and signed the bill of lading, it is his sole responsibility to ensure the safe carriage and right and true delivery of the goods in the same good order and condition in which he received them.

Further, with a vessel loading for several ports all cargo must be loaded to meet the discharge requirements to the best advantage.

The Master must arrange for the stowage so that the time taken in loading and discharging is at a minimum and the cost as low as possible. It must be pointed out, however, that it is far more important to carry and deliver cargo in an undamaged condition, than to study cost or economy of space.

The Master must take full responsibility for the stability of his vessel. Many ships though stable with a homogeneous cargo of 45 cubic feet to the ton, would become unstable with one say of 60 cu. ft. It can therefore be realised that this point demands from the Master not only an expert knowledge, but a very heavy responsibility to ensure the safety of his vessel, cargo and crew.

Further, it is to be noticed in connection with stability, that in the case of a general cargo, a vessel may be loaded so that she is stable or unstable with the same cargo. It depends entirely on **"stowage."**

It is of the greatest importance to see that the ship or merchandise is not damaged during the carriage or handling of the cargo. Nothing is more conducive to this than bad stowage.

In view of the responsibility resting on the Master, it would be well to here mention the case of "Charterer's Stevedore." Frequently a clause is inserted in the Charter Party stating that the ship is to employ Charterer's or Shipper's Stevedore, and of course, on a Time Charter, the Charterers always appoint their own stevedore.

Many cases have arisen where these stevedores have stowed the cargo in such a manner that damage has been caused through bad stowage or inefficient dunnage.

When claims are formulated by Receivers it is useless for the Master or the Shipowner to argue that it was stowed by the servant of the Charterers or of the Shipper. **The Master is wholly and solely responsible for the stowage of cargo.**

From the **MERCHANT'S,** that is the Shipper's and Consignee's point of view, the actual stowage of cargo is almost beyond their control, and while it may not appear to concern them very much, the manner in which the goods are stowed and carried is actually often of very great importance to them.

It may be thought that if goods are damaged through bad stowage, and a claim is made by the receivers on the ship if it is proved that the damage occurred through bad stowage and the ship pays the claim, that the merchant should be satisfied. But this is not so, as it interferes with his business, insomuch that perhaps he has sold these goods for a prompt delivery, and the order not having been filled, he loses his business. Hence damage by bad stowage affects the merchant, and this probably eventually affects the shipowner. If the merchant is frequently shipping by a regular line and finds his goods damaged by bad stowage, he will naturally prefer to ship by a line that can stow cargo in a more efficient manner.

It is unreasonable to expect the person in charge of the loading of a vessel to be fully conversant with the nature and properties of all cargoes. Therefore it is essential that shippers should at all times furnish detailed information, if requested to do so, of any unusual properties that may be possessed by their goods. This is in their own interest, as many cases of damage occur which might have been avoided if the necessary information had been furnished or indicated on the package.

Finally, there are the **UNDERWRITERS**, who are also greatly affected by stowage ; often severe damage occurs by cargo shifting, etc., for which underwriters are called upon to pay as "sea damage," but which is in reality the outcome of "bad stowage" and ought never to have occurred.

That this is realised is evident by the fact that in America and other places many cargoes cannot be insured unless they have been loaded in accordance with special regulations drawn up by the local Board of Underwriters, who appoint surveyors to supervise the loading and issue a report that the goods have been well and properly stowed according to their regulations.

From all points of view then, it is evident that **efficient stowage** is one of the most important factors upon which the carriage of goods by sea depend, and it is hoped that in the following chapters much information is given which will be of service.

SHORT GLOSSARY OF TERMS RELATIVE TO CARGO

ABURTON. Another word for athwart.

AMIDSHIPS. In the centre of the vessel, either with reference to her length or to her breadth.

ATHWART. Across, or at right angles to the fore and aft line.

BALLOT. A small bale ; usually from 70 to 120 lb.

BILGES. The space at the sides of a vessel, between the margin of tanks and ship's skin, into which water drains and is pumped out.

BLEEDING. The act of cutting bagged cargo and allowing the contents to become loose in order to reduce stowage capacity.

BLOCKING OFF. The operation of so jambing cargo in a space not completely filled that it will not " shift " in heavy weather.

BREAK BULK. To " break bulk " is to commence to discharge.

BROKEN STOWAGE. Small packages or small portions of cargo used to fill up the empty spaces caused by the stowage of large and uneven sized packages. The space thus filled is also termed " broken stowage."

BULK. Cargo is said to be stowed in bulk when it is stowed loose instead of being first packed in containers such as casks, bags or cases, etc.

CARBOY. A large glass bottle containing anything from 10 to 30 gallons, usually packed in an iron crate. See also page 31.

CARGO BATTENS. Lengths of wood usually about 6 × 1½ in. running fore and aft inside the framing of the vessel bolted or hung vertically from the frames about 1 ft. apart to prevent cargo coming into contact with the shell plating and frames, etc.

CEILING. The wood planking of holds laid on top of double bottom tanks or floors.

CHOCK. A piece of wood or other substance placed at the side of a cask or package to prevent it rolling about or moving sideways.

COAMINGS. The sides of the hatches or other openings in a deck, standing vertically, to prevent water going down the hold. Portable hatch covers are fitted to the upper part of coamings.

CUNTLINE or CANTLINE. The space or groove between two fore and aft tiers of casks stowed side by side. When the bilge of one cask is laid in the cantline of the tier below and resting on the heads of four other casks, it is said to be stowed " bilge and cantline."

DEMIJOHN. A large bottle, up to, say, 5 gallons, covered with basket work. See page 32.

DHOLL. A small roll or bundle of skeins rolled together used in connection with some fibres, such as coir.

DRAUGHT. The depth in the water to which a vessel is immersed.

DUNNAGE. Loose wood or other substance placed under and around the cargo to prevent damage, and to raise it above the ceiling or deck to provide a free passage for any water which may get into the hold to run into the bilges.

EVEN KEEL. The situation of a vessel when she is so trimmed that she floats evenly in the water, neither end being immersed more than the other.

FIRING POINT. Is the lowest temperature at which an oil itself will burn.

FIRKIN. A small wooden cask used for butter, etc. Also a measure of capacity.

FLASH POINT. The temperature at which oil evolves enough vapour to form an inflammable mixture with the air above it.

FLOORING OFF. Laying the first tier of cargo in the bottom of a vessel's hold.

GROUND TIER. The bottom tier of cargo in a vessel's hold.

HATCH or HATCHWAY. An opening in the deck to allow cargo to be taken up and down to the holds. The coverings over these openings are called hatch covers, and are usually made of wood. In refrigerated holds under the ordinary hatch covers an insulated hatch is fitted called a " plug hatch."

JETTISON. The act of throwing goods overboard.

KEG. A small cask or barrel.

LIST. The inclination of a vessel to one side.

LOG BOOK. A journal kept by the chief officer of a vessel in which is entered all records of navigation, and also any occurrences concerning damage to vessel or cargo. It is of the utmost importance that this book should be an absolutely true record, as in the event of a vessel arriving with damaged cargo it is largely with the assistance of this evidence that a surveyor can determine whether the damage is caused by peril of the sea or otherwise.

LUGS. The bunched up corners of a bag.

NESTING. Fitting one article of cargo, such as pipes, bowls, etc., one inside the other to economise space.

PARCELS. A term used in relation to cargo to indicate a small quantity.

PILFERAGE. When cargo is broached and part of the contents stolen it is called pilferage or pillage.

POCKET. A small bag, usually about half the size of an ordinary bag, containing such articles as hops, myrobalans, etc., often shipped from Eastern ports at reduced freight and used for broken stowage.

QUOIN. A wooden wedge used in the stowage of casks to secure them against movement.

RUN. The narrowing of the after part of a vessel's hold as it approaches the stern. Cargo will always stow badly in the "run."

SEROON. A package or bale, as of tobacco, indigo, etc., covered with hides, or wood bound with hide.

SKIN. This word used in relation to a vessel means the inside of the outer shell plating of a vessel.

TARE. This word means weight, and is usually applied to the weight of a containing vessel when empty.

TARE AND TRET. Allowance made for the weight of a container and wastage.

TRIM. The condition of a vessel with reference to her draught.

TRUSS. A bundle, such as a truss of hay.

ULLAGE. The deficiency from the normal capacity of the quantity contained in a cask.

WINGS. The sides of a vessel's holds. Cargo stowed along the sides of a vessel is said to be stowed in the "wings," and the outside tier is known as a "winger."

CARGO PENALTIES

Not taking precautions against grain shifting ..	£300
Submerging, failing to mark, or altering load line or draught marks	£100
Failure to produce memorandum of space occupied by deck cargo	£100
Carrying goods or stores in space measured for propelling power	£100 each Master and Owner
Carrying wood deck cargo in winter except as allowed (see page 164) for every 150 cub. ft. of space occupied	£5
Stowing cargo in crew space (after complaint) ..	1s. per day per man

CHAPTER I

PRINCIPLES OF STOWAGE

THE word "cargo" covers a great variety of goods and commodities which are stowed and carried in many and varied ways; such as in bulk, bags, cases, barrels or casks, bales, cylinders, carboys, etc., and in this chapter we propose to give the general methods and principles to be followed when actually stowing the goods.

The carriage of cargo both as regards the method of stowage, variety of articles carried, and also the ways and means of packing, have undergone tremendous changes in the past few years. These changes are consequent on various circumstances, such as the increased size of vessels, the shortening of voyages, variation of markets, and the fact that much cargo originally carried as raw material is now partly or wholly manufactured in the country of origin. Again, refrigerator or insulated ships have made it possible to convey at sea much commerce that it was previously impossible to carry over long distances.

For example: in the old days tea was carried in full cargoes in the tea clippers; now what would have been a cargo for one of these vessels is shipped as a "parcel" or consignment in a large vessel or regular liner. Again, with the shortening of voyages, owing to the speed of vessels, many articles are now taken which could not be carried in the days of sailing vessels with long voyages.

As regards partly manufactured goods, take for instance sugar, which was previously carried raw, but is now often imported in a refined or semi-refined state. Many seeds were imported for the production of oil; now, in a number of cases the oil is extracted in the country of origin. Again, the introduction of insulated ships has revolutionised the carriage of foodstuffs, especially in the case of meat, where it has made the greatest strides, and has almost eliminated the carriage of live stock.

A great number of vessels now load cargo at one or more ports for discharge at one or more ports, and in these cases the stowage requires great attention and study, for too much care cannot be given to the "lay out" or **planning of the stowage.** It is of course not always possible to do this, as in many cases a vessel is already loading before bookings are actually completed, and cargo has to be taken on board as and when it arrives.

otherwise big expenses are often incurred for demurrage on craft or trucks, etc.

Whenever possible it is desirable to arrange to stow the cargo so that there is a fair distribution for each port over the various holds of the vessel, as the time in port depends on the amount of cargo to be delivered from the largest hatch.

Cargo loaded for several ports should be **port-marked** if possible. This is usually accomplished by allotting a certain colour to each discharging port, and it is customary to either chalk or paint this colour on the cargo for the corresponding port.

Another important point to notice in loading a vessel for more than one port, is, to see that the cargo is so stowed that when it is discharged at the first port, the portion which remains in the vessel in any hatch for delivery at a later port is not left in such a condition that it will break adrift, or be in danger of "shooting" or falling, whilst the cargo for the first port is being discharged.

This applies specially to a case where, say, a lower hold is divided vertically in two halves for two ports. In that case, in the forward holds the cargo to be delivered at the first port should be stowed in the forward end, and the cargo for the second port sloped slightly towards the after end of the hold as it rises; the exact opposite rule applies to the after holds.

Goods are often shipped as "**optional cargo,**" which means that the shipper or consignee has the option as to which port these goods must be delivered at, and it is usually declared, say, 24 hours before the arrival of the vessel.

Optional cargo always adds greatly to the difficulty of stowage. But, if possible, such cargo should be stowed so as to be accessible at any of the ports of discharge mentioned in the bill of lading.

Methods of loading differ very much in different ports, so that it is impossible to more than generalise on the many features of loading cargo; but there are a number of fundamental principles that must always be kept in mind and observed when stowing certain goods.

Heavy articles, for example, naturally occupy less space, if properly stowed, than light articles; and owing to the necessity of giving the vessel sufficient stability, it is advisable to keep these as low as possible in the vessel.

For instance, in loading a mixed cargo of cereals, it is important to see that grain of a heavy nature, such as wheat, is stowed below light grain, such as oats, etc. Also in loading a general cargo, that heavy packages are not stowed above light and frail cases. This principle particularly applies when loading a mixed timber cargo, as often the whole benefit derived from the carriage of a deck load may be ruined by the improper stowage or arrangement of timber in the lower holds.

Further, care and consideration must be given when stowing a mixed cargo as to how space for each commodity is allotted. This for various reasons is imperative, as it is useless to take special precautions to see that a parcel of cargo is " properly stowed " if it is stowed in the wrong place ; such as being placed in close proximity to other cargo which might damage it by taint, or which might become damaged by taint ; or in an unsuitable position, such as near engines or boilers when liable to be damaged by heat.

Whilst in this chapter we give our opinion as to the best methods of stowing the various commodities, circumstances at all times alter cases, and the method employed at one time may not always be found suitable or possible at another.

Therefore in making use of this information we trust our readers will have special regard to any exceptional circumstances that may exist, and arrange their stowage accordingly.

Bulk

A cargo handled and shipped in mass form is called a " bulk " cargo ; and this often constitutes the whole or a large part of the vessel's capacity. In many trades special ships have been built for the carriage of bulk cargoes—tankers, grain carriers, and colliers are notable examples of this.

The term " stowage " is not applied to a " bulk " cargo ; but nevertheless all such cargoes, excepting liquids, require to be **" trimmed."**

The question of trimming may be more or less simple, according to the commodity involved, but the importance is just as great in all cases. For instance, with a liquid cargo such as oil this " trims itself," but special precautions must be observed to prevent such cargoes acquiring a " free surface."

The trimming of coal is a laborious, expensive and difficult operation, and we are afraid that it is not realised how important it is to see coal is well trimmed, and the grave consequences that may arise out of the neglect of such precautions.

Grain, however, is more difficult to trim ; and although partly provided for by the use of feeders, the greatest care is always necessary to see that a grain cargo is properly trimmed.

When loading a part cargo in bulk with other cargo stowed on top of it, care is always necessary to see that a proper and sufficient separation is made ; having regard to the liability of damage occurring to the cargo above the grain through it not being stowed on a solid enough foundation, or the mixing of the two cargoes, or damage owing to heating or to any special properties of the cargo concerned.

One point to be considered with a bulk cargo which may be of such a heavy nature that the vessel will not be full, is to arrange the stowage so that as many compartments as possible are full. It is distinctly preferable to have two hatches full and two partly filled than to have four unfilled hatches. Of course the stability and trim of the vessel must be taken into account at all times in considering the other features of bulk cargo stowage.

Bags

A large number of commodities are carried in bags, and this is undoubtedly a convenient and economical form of packing for handling and shipment. The method of stowage for cargo in bags depends on several factors; such as the size and quality of the bag; nature, condition and quality of the contents, and also the requirements of the particular commodity as regards ventilation, etc. For example, one would not stow a bag of rice in the same manner as one would stow a bag of nitrate.

It will be found that we have mentioned the stowage of most bag cargoes under their respective headings, but there are, nevertheless, certain principles of stowage which apply to practically all bag cargoes.

Care must be taken when stowing bags that they are **well dunnaged and protected** against all ironwork. No bag should be allowed to overlap a beam, stringer plate, or other such obstruction in the hold; otherwise with the slightest sinkage, or even the working of the vessel, the bags are likely to be cut, the contents become loose and wastage occur.

The tiers should be stowed fore and aft right across the vessel; but in the case of a ship that is close dunnaged and perhaps matted in the sides, we recommend, if convenient, that the bags in the wings should be stowed athwartship as this leaves only the end of the bag close to the ship's side, and in the event of sweat running down between the mats or dunnage and the vessel's side, only the end of the bag is liable to damage.

In the case of a vessel loading bagged cargo and only using the wooden cargo battens for dunnage, we recommend that the bags be stowed on end in the wings. This will prevent the belly of the bag from projecting between the cargo battens and possibly touching the iron of the frames or shell plating.

As regards the method of stowing the bags in tiers, this depends entirely on the commodity carried. If it is one where all possible ventilation is required, then they should be stowed one bag on top of another, with the ends well butted, as in Fig. 1, but if ventilation is not of such importance and the bags are soft, better stowage will be made by stowing half bag, as shewn in Fig. 2. In this case it will be necessary to stow the wing bags on edge.

In many ships it is the custom to lay the tween deck hatches along the wings in the tween decks as dunnage, so that any moisture from sweat or any water getting into the hold will run along to the scuppers. We have frequently found in these cases that the belly of the bag has either gone over the edge of the hatch, or gone between the hatch and the first piece of dunnage, and we suggest that it is a good plan either to allow the athwartship dunnage to extend over the hatches and stow the bags fore and aft; or if the dunnage is laid fore and aft, to stow the wing bags athwartships.

In stowing blocks of bags in a tween deck for a run between loading ports, it is advisable to lock or "cross tie" the corner bags to prevent the block from collapsing or shooting.

When handling bag cargoes great precaution is necessary regarding the use of hooks. With some goods this is of little importance, but with others, such as valuable seeds, sands, or some grains, the slightest hook hole in a bag may mean a serious loss.

When working a bag cargo it is always economical to have a needleman standing by. It is an old saying "a stitch in time saves nine," and often a stitch or two in a slightly torn bag will perhaps save half of the contents being lost.

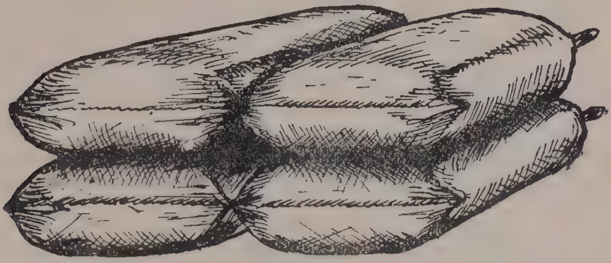


FIG. 1
BAG STOWAGE

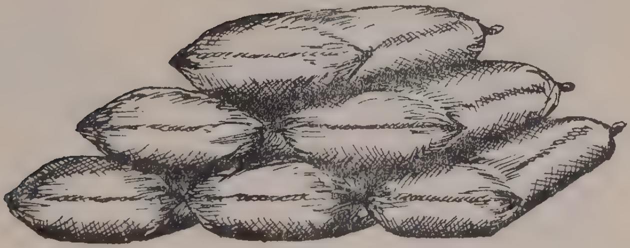


FIG 2
BAG STOWAGE

When stowing a mixed cargo such as that shipped in Bombay or Karachi, one would suppose that the heaviest bags should be stowed in the bottom of the vessel, and light bags and bale goods above. This is not the best method, however, providing the stability of the vessel is taken into consideration. A mode of stowing sometimes termed the "sandwich" method has often proved advantageous. By this we mean to put tiers of lighter cargo in between tiers of heavy grain such as bagged wheat, etc. This will often be found a very great advantage, and a ship will carry a much better cargo if this method of stowage be adopted.

Cases

The stowing of cargo in cases is quite a simple operation providing they are all of an even size, such as cases containing canned goods, etc ; but with a mixed cargo where the goods are shipped in many different kinds of cases it becomes a more difficult problem. One finds in a general cargo such a varied assortment of cases as regards their shape, size, weight and construction that the proper stowage of a cargo such as this is often a matter of considerable difficulty.

It is necessary to select the heaviest and strongest cases to be stowed in the bottom of the vessel, and in loading every effort should be made to keep a level tier by filling up all holes with small cases. If the cases in the working tier are not particularly strong they should be boarded over before starting the next tier, as this will not only save the smaller cases from damage, but in the long run will enable a better stowage to be made.

With large cases, such as those containing motor-cars or machinery, great care should be taken that they are stowed perfectly level, in order that the bearing of the case may be evenly distributed over the bottom. When stowing in the upper tiers no case should be allowed to rest inside the edges of the case beneath it, unless boards are placed across the lower case to take the weight.

Light bulky cases require careful attention, as it often happens that perhaps these are stowed not quite evenly ; and excessive weight is loaded on top of them, hence they are often found in the hold in such a condition that it is almost impossible to move them without their falling to pieces. In this way serious damage to the contents has often been sustained.

It is frequently found that cases are far too light for the heavy goods they contain. Such cases should on no account be stowed on their sides, as with the movement of the vessel the weight may come on the lid, and on discharge this is often found loose in the hold with the contents exposed and even damaged.

In loading a cargo of light cases such as milk, dried fruits, macaroni, vermicelli, etc., the working tier should always be protected by laying down walking boards. Stowage should be commenced in the ends of the holds, working out towards the centre of the hatch, and stowed to a working height of say three or four tiers ; and when these tiers are completed a boardway should be laid so that the stowage of the next tier can again commence from the bulkhead, and as the cargo is worked out these boards should be removed.

When stowing cases such as these into barges where they are stowed tier by tier, it is advisable to stow the working tier on their ends, otherwise many cases will be broken by the men walking on them.

Sometimes cases of valuable goods, such as ostrich feathers, silks, etc., are wrapped or sewn in hessian or canvas, and sealed.

When receiving cases of this description the utmost vigilance is necessary to see that the wrapping and seals (if any) are intact; if not they should on no account be accepted without being first examined, and a receipt given in accordance with their condition.

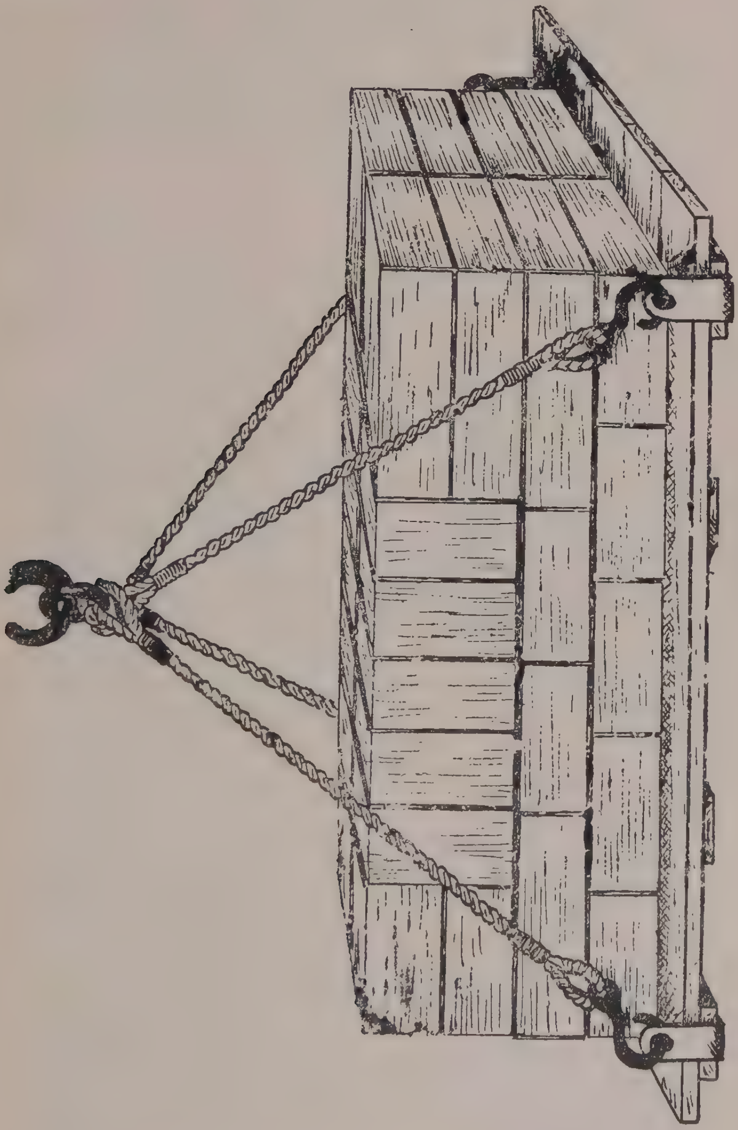


Fig. 3
Cases Loaded on Tray

Another point to see to when stowing such cases as lard, etc., is that the tiers are always kept perfectly horizontal. When working out towards the turn of the bilge, where the ceiling starts to rise, there is a great temptation to allow the wing case to tilt a little rather than to shut out a whole case. **This is fatal,** as the following tier overlapping this will put extra pressure on the canted edge of the lower case, and it is practically certain that all these edge cases will be found crushed or with the sides loose. The end case should have been left out and the space filled with dunnage wood, and a board placed on the first and subsequent tiers until the maximum width of the hold was reached.

In our opinion one thing should always be borne in mind when loading cases, especially when they are all of the same size ; and that is that one case should never rest exactly on the case below it, but should have a bearing on the **two** cases beneath it —or in other words should be stowed more or less like the bricks are laid in a wall.

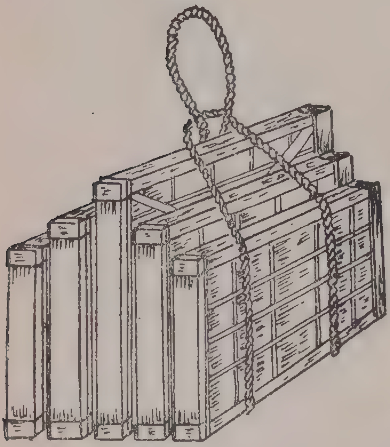


FIG. 4
GLASS CORRECTLY SLUNG

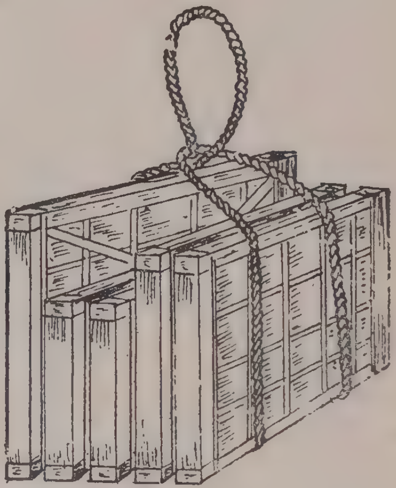


FIG. 5
GLASS INCORRECTLY SLUNG

As regards the handling of cases, this, like the stowage, depends entirely on the size, weight and construction of a case. All heavy and bulky cases such as motor-cars, etc., should be slung at both ends, and ordinary heavy cases such as ironwork or machinery should be slung with wire or chain. In the latter case it is advisable to put a piece of wood under the chain at the edge of the case.

Small case goods, such as cases of lard, fruit, milk, etc., we consider should always be handled on boards or trays as shown in Fig. 3. Light bulky cases, however, may be slung with rope strops, but they should on no account be built up squarely into large sets. (See Figs. 29 and 30, pages 202 and 203.)

Large flat cases of various sizes containing fragile articles such as glass, etc., should be slung on their edge with the smaller cases on the outside as shown in Fig. 4, and on no account be slung with the smaller cases on the inside as illustrated by Fig. 5 ;

otherwise there is a tendency to double up the outside cases and seriously damage the contents.

Very small light cases or cartons should be handled in canvas slings or nets.

Casks, Barrels, Puncheons, Hogsheads, Kegs, etc.

Casks and barrels may, of course, be of various sizes; but in this work we have used the two terms synonymously as regards their stowage, and include all liquid and other containers, such as barrels or casks, hogsheads, puncheons, pipes or butts, kegs, etc., in the principles recommended.

We do not intend to specialise in any one particular kind of barrel, as these range from huge pipes of wine to, say, a small keg of vinegar, and we must leave it to those concerned to use their own discretion as to which of the methods herein described is best applied to the article with which they are dealing.

The stowage of barrel cargo is a very wide subject, as so many circumstances govern the stowage, such as the size, quality, construction and condition of the barrel, the nature of the contents, whether dry or wet, and whether the contents are such that leakage would damage other cargo. Again, consideration has to be given to the conditions as regards space, etc., in which they are to be stowed, what cargo is to be stowed in the same hold with them, and also the circumstances attendant on the contemplated voyage.

It appears to us, as practical men, that it is somewhat ludicrous that anyone in authority should continue to abide by the antiquated scale which has been long recognised, namely, that only three tiers of pipes, four tiers of puncheons, six tiers of hogsheads, etc., should be stowed. Conditions have so altered as regards the class of vessel and construction of barrels, that it may be possible nowadays to stow six heights of pipes and deliver them in better order than was formerly possible with, say, five heights of barrels.

There are certain fundamental principles, however, which govern the stowage of all barrels or similar containers. These are that in all cases pressure must be applied to the strongest part of the barrel; due consideration must be given to what weight has to come above the barrels, and such factors as temperature must be allowed for.

In order to take these into account we must consider the barrel itself. In the first place the strongest part of a barrel is at the quarter hoop and the weakest at the centre of the bilge or belly. Therefore any pressure it is necessary to put on the barrel should be applied on or near the quarter hoop, and no pressure placed on the bilge. Hence the expression for barrel stowage **"bilge free."**

Then again, in looking at Fig. 6, which represents a properly constructed barrel, it will be seen that the sections of the head of the barrel are vertical when the bung is on top. Consequently in this position the barrel is better able to withstand top pressure, hence the reason for the requirement for proper stowage of a barrel to be **"bung up."**

On the other hand, if one looks at Fig. 7, it can be seen that this represents a badly constructed barrel. It is obvious that if this barrel be stowed "bung up" and pressure be applied on or around the quarter hoop, there will be a tendency for the head of the cask to be shifted out of the circle and the cask will consequently leak. This tendency would apply just the same if a properly constructed cask is not stowed "bung up."

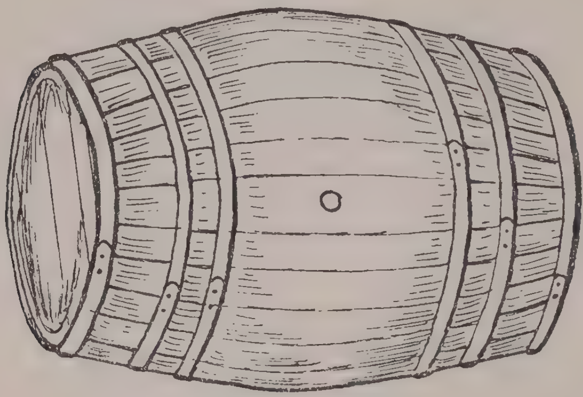


Fig. 7

Barrel—Incorrectly Constructed

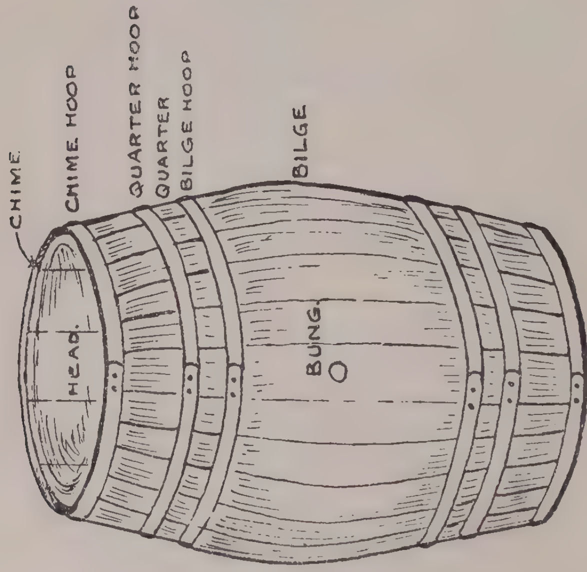


Fig. 6

Barrel—Correctly Constructed

It will also be noticed in Fig. 6 that the rivets in the hoops are in line with the bung, whilst the reverse occurs in Fig. 7. In a correctly made barrel, properly stowed, the bung should be "up," with the rivets of the bands all on top. This ensures that the head pieces of the barrel are vertical, and consequently that the barrel is in the best position to withstand a heavy strain.

In loading barrel cargo the most important operation is the stowing of the bottom or lower tier of barrels. These should be stowed fore and aft, starting at one end of the hold amidships and worked out athwartships towards the wings. The casks should have proper beds laid athwart for their quarters to rest upon, sufficiently high so that the bilge of the cask will be clear of the floor, and the bung should be "up." Quoins should be driven in on each quarter of the barrel on top of the beds to prevent the cask moving sideways.

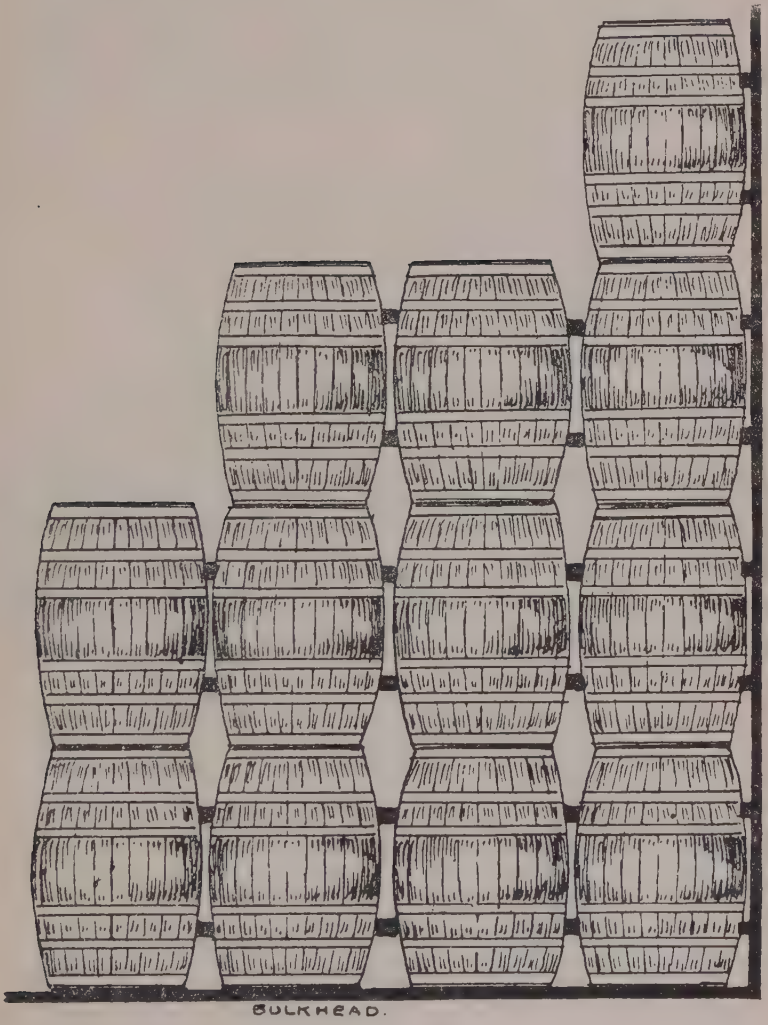


Fig. 8

Barrels Stowed Bilge and Bilge

N.B.—Vertical distance between casks exaggerated for better illustration

The heads of the second layer should be butted exactly on to those of the first, so that the chime of one cask cannot work into the head of the next. In this way the barrels can be kept absolutely parallel, so that the cantlines will be straight for the stowage of the upper tiers.

It is of great importance when the wing is reached, not to allow the wing barrel to be any higher than the others in the same tier. The barrels should not be carried any farther out into the wing than can be done by keeping them level. The space between the end barrel and the vessel's side must be well filled with dunnage, securely packed in ; for if there is the slightest slackness in this position and the wing barrel moves, it will upset the whole of the stowage above and possibly cause serious damage.

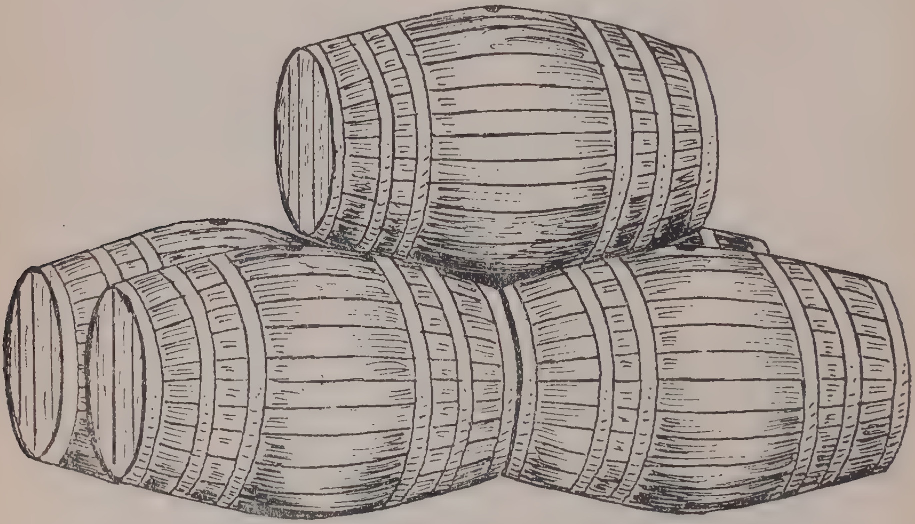


Fig. 9

Barrels Stowed Bilge and Cantline—Half Cask

The succeeding tiers may be stowed "bilge and bilge" or "bilge and cantline." To stow "bilge and bilge" (see Fig. 8), wood must be laid across on top of the quarters of the lower tier to form beds for the upper tier to rest upon, and this wood must be sufficiently thick to keep the two bilges of the barrels apart. The stowage of the upper tier on these beds should be the same as in the lower tier, with quoins on the beds as before. Additional chocks may be placed between the casks to prevent movement.

We have no hesitation in saying, however, that, in our opinion, the very best stowage that can be given to barrels is what is termed "bilge and cantline"—stowed half cask, as depicted in Figs. 9 and 10. In this stowage the second tier must be started half cask away from the bulkhead, and the space so caused filled up with dunnage wood laid athwartships as shown in Fig. 10, so that the barrels of the first layer in the third tier will rest partly on a bed laid on this dunnage wood, and partly on two casks of the tier below. Each barrel of the second longer will, of course, rest on four barrels of the tier below.

One great advantage of this stowage is that the weight of each barrel is distributed over four barrels below it. We have known a great many heights of barrels of liquid, such as turpentine, to have been carried in this manner without any leakage occurring.

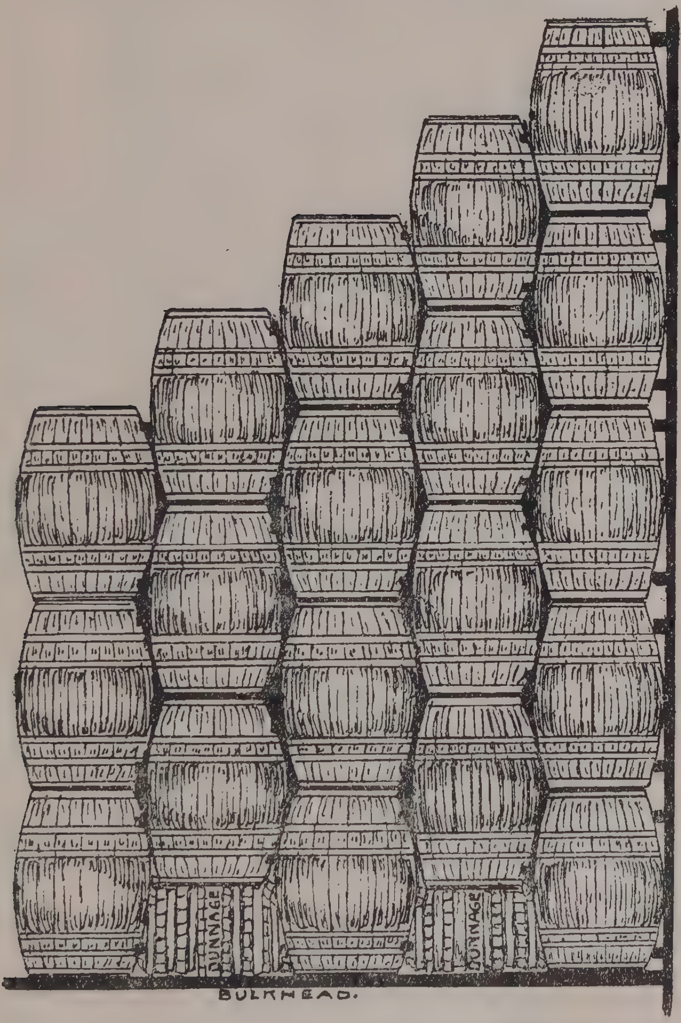


Fig. 10.
Barrels Stowed Bilge and Cantline—Half Cask.

There is great divergence of opinion regarding the necessity of "skidding" a barrel cargo, say, after three or four tiers are stowed. Some advocate to skid over the first tier, and then again on perhaps the fifth tier; but our view is that unless good secure support for the skidding is arranged it is often detrimental rather than helpful to good stowage.

By "skidding" is meant the laying of a floor or platform all over a tier of casks. If this method is used, we consider it should only be employed, say, on the level of a tunnel, or a stringer, or in a position where the weight can be taken direct on to the ship and not on the cargo stowed below.

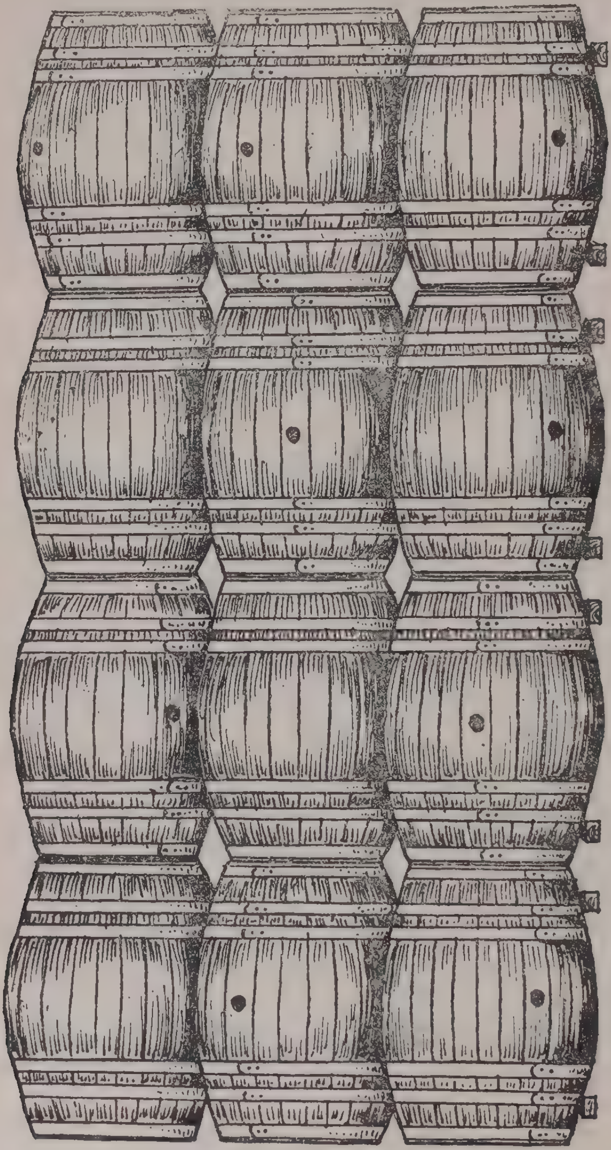


Fig. 11

Bilge and Cantline—Whole Cask

N.B.—The figure also illustrates faulty stowage for full casks, as the bungs should be " up."

To simply lay a platform of boards on top of the casks below, is in our opinion to do harm, as this will only shift the pressure on to the points where the boards of this platform rest. Whereas, if there is no platform, each barrel will rest, as mentioned above, on four barrels below it.

One has also to take into consideration the weight of the platform itself, which will be considerable if the timber is to be of sufficient strength to carry much weight.

There is another great advantage in the "bilge and cantline" method of stowage, and that is the great saving in space that can be effected as compared to the method of stowing "bilge and bilge."

The barrels may, however, be stowed "bilge and cantline" whole cask, as shown in Fig 11. In this case, of course, it is necessary to start amidships and stow the first casks in the cantline of the midships tiers where there is no fore and aft bulkhead. If there is such a bulkhead, it will be necessary to lose a certain amount of space alongside this, and out in the wings of the vessel; and this space must be properly filled in with dunnage.

There is really no difference as regards the carriage of barrels stowed in this way to those stowed "bilge and bilge," as the weight comes practically in the same place. There is a slight advantage in space, however, as it is not necessary to have such thick beds, owing to the fact that although the bilge is kept clear of the cantlines of the tier below, it does not occupy so much space vertically. We do not recommend this stowage except in the case of empty casks, and then, of course, no beds are necessary.

It is customary in some trades, where only a single tier is required and no weight to come on top, to stow barrels on their ends; but this method should only be resorted to under special circumstances, as it lends itself to abuse; and one can never tell whether it may be necessary ultimately to load heavy cargo above these barrels.

Many liquids are now carried in large steel drums. These are of two kinds: flanged, as depicted in Fig. 12; or corrugated, as depicted in Fig. 13. In the case of the flanged drums, these should be stowed directly on their rails or flanges, and if any dunnage wood or beds are placed underneath them they should be as nearly as possible of the same thickness as the flange, because if they are any thicker the sides of the drum will become dented. Some opinions advocate that these steel barrels should be stowed with every other barrel "off set" slightly, so that the flanges may overlap; but we much deprecate this method, as we often find that where the flange of one drum comes into contact with the side of the adjacent drum the bands have sawn into the side and leakage has occurred, especially where there has been the slightest movement in the cargo or even heavy vibration. We favour the stowage of drums perfectly level, so that the rails coincide, with wood placed fore and aft in the cantlines of each tier to receive the flanges of the tier above.

As regards the corrugated drums, these are much weaker and should not be stowed to any great height. As they are usually fitted with screw bungs in the ends, we recommend that these should be stowed upright with sufficient boards in between each tier, and we have found that they carry better in this manner.

In the foregoing paragraphs we have dealt entirely with barrels containing liquids or semi-liquids. In the case of barrels containing solids they must be stowed according to circumstances and the nature of the contents.

For example, no one would think of stowing light casks of glassware "bung up and bilge free." Such casks can always be stowed on their ends, but particular care must be taken to see that they are on a perfectly level foundation. It is imperative that substantial boards be placed between each tier, and if other cargo—which must of necessity be light—be stowed above such articles, the top tier of barrels should be well boarded over.

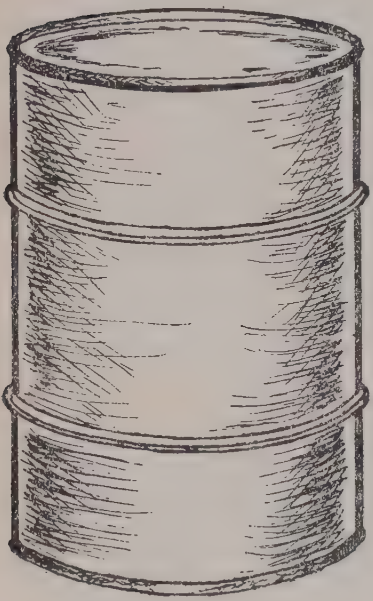


FIG. 12
STEEL BARREL—FLANGED

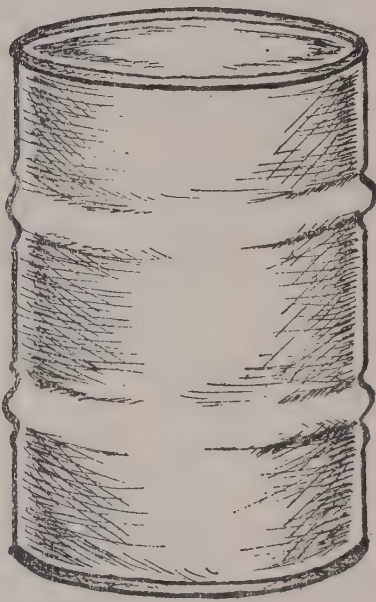


FIG. 13
STEEL BARREL—CORRUGATED

Empty barrels are often accepted for shipment without any note whatever being taken of what they have lately contained, and it has been found that some are highly inflammable or even filled with gas remaining from their previous contents. Therefore great precautions should be taken to note their condition when receiving empty barrels. Empty barrels intended for carrying liquids, etc., should not be stowed near the boilers or exposed to heat on long voyages, if this can be avoided, as they frequently dry up and become slack, or even collapse.

Bales

The term "bale" covers a very wide area, many different articles being shipped in just as many different kinds of bales. Some, such as piece goods, are packed in hard bales bound with iron or other bands, and some, such as bales of cotton or wool, are even hydraulically pressed. Fine goods are also made into slack bales and covered with hessian or other stronger material, and other commodities, such as leather, cardboard, etc., are baled without any coverings. The stowage for most of these articles is given under their respective headings, but there are a few general precautions that should be taken which applies to all baled goods.

First, they must be kept **dry and well dunnaged.** They should not be stowed on dunnage with sharp edges such as quartering or battens, but should always be stowed on board dunnage; with fine goods this dunnage should be covered with mats or some similar article.

In stowing bales composed of any commodity which is in layers, they should always be stowed on their flat in the bottom tier, except the bales around the vessel's side, which should always be stowed on edge; the reason being that, should any water get into the compartment, or heavy condensation occur, only part of the goods in each bale will be damaged; whereas if they are stowed on their edges on the ceiling, or on their flats at the ship's side, the edge of each layer would be damaged and consequently affect the whole bale.

Bales of all kinds should be well blocked off, as the motion of the vessel will cause heavy chafage if the cargo has any movement whatever, apart from the movement of the vessel, and this should be guarded against with the utmost diligence.

With mixed bales it is always advisable, as far as possible, to stow marks and numbers uppermost. Great care should be taken to stow all baled goods well clear of cargo of a greasy dirty nature, otherwise serious damage may result if the bales become stained.

It frequently occurs that when stevedores are loading a vessel with highly pressed cargo such as cotton, if a small space requires filling they break the bands of the bales in order to block them off. This is not an uncommon practice, and in our opinion should be avoided.

The allotment of suitable space for bales requires careful attention in loading a general cargo, having regard to other goods which are to be carried. If case goods are stowed above bales, especially light cases, a good secure floor should be laid on the bales, otherwise, if only thin dunnage wood is used, this will "give" (especially if the bales are soft), and the cargo above will suffer damage in consequence of becoming displaced.

In handling bales on no account should any hooks be used, as often one small hook hole will penetrate many layers of the goods the bale contains, and although it may appear to be only a small hole, possibly the result will be a heavy claim. This applies especially to high-class piece goods and bales of certain papers.

In stowing a large consignment of bales of similar size it is advisable as the loading progresses to carefully measure the head room, as often by paying particular attention to this, and perhaps putting one or two tiers on their edges or even on their ends, it is possible to arrange for the top tier to finish close underneath the deckhead, and thus avoid loss of space.

Cylinders

These are steel containers used for the purpose of transporting gases such as ammonia, oxygen, etc., under pressure. They are usually made in one piece without seams and are fairly easy to stow.

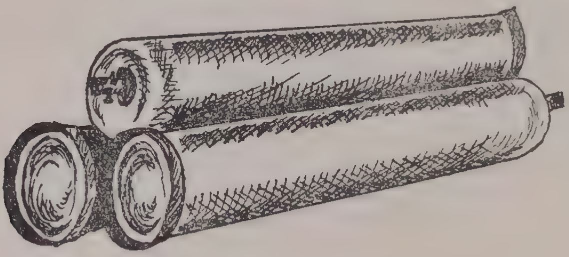


Fig. 14
Cylinders Correctly Stowed

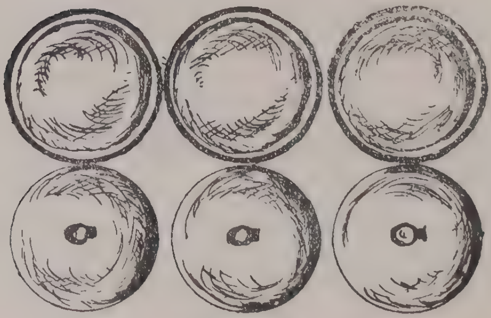


Fig. 15
Cylinders Incorrectly Stowed

They should generally be carried on deck, in which case the lower tiers should be stowed fore and aft on planks laid athwartships to keep the flange, which extends slightly at one end, clear of the deck.

The second tier should be stepped back a little, and stowed the reverse way ; so that the head, or cap, of the cylinder will just rest inside the flanges of the lower tier as shewn in Fig

14, and in no case should these be stowed "bilge and bilge" as shewn in Fig. 15.

After the cylinders are correctly stowed to the necessary height a good stout lashing should be placed across them from stanchion to stanchion, and well frapped down in the middle if there is a convenient ring bolt or other means of securing the frapping.

A very good method is also to lay long deals across the cylinders and wedge these down under the rail on each side.

When cylinders are shipped empty and can consequently be stowed in the hold, no special stowage is required ; but they may simply be laid as above described, for example, on each side of a tunnel or on either side of the midship stanchion in the hold.

Carboys, Demijohns, etc.

A carboy is a glass container packed either in a wicker or iron basket, as shown in Fig. 16, and is principally used for carrying acids or such like liquids, in which case, of course, they are nearly always stowed on deck. In this event, they should be stowed evenly on planks in a convenient position where they are always accessible, so that, should an accident occur and a carboy become broken, it can easily be thrown overboard.

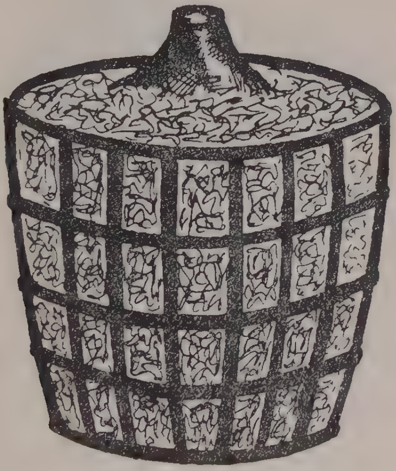


Fig. 16
Carboy

Carboys should be securely lashed with wire rope if available, as if leakage occurs the acid will often burn rope lashings.

It frequently happens, however, that carboys contain some liquid that it is unnecessary to carry on deck : in which case they should be carefully stowed by themselves in a convenient place in the hold, preferably in a tween deck against a bulkhead. If it is necessary to stow more than one height, a board should be laid on top of the lower tier of carboys on each side of the neck and the bottom of the carboy in the second tier should rest on this wood, and between two necks of the carboys in the tier below.

The great thing in stowing carboys is to see that they are well chocked off and are not subject to any great side pressure.

Carboys are sometimes shipped securely boxed in and this packing can be recommended.

Demijohns are a similar but smaller type of vessel to a carboy, and generally contain from 1 to 5 gallons (see Fig. 17). In the case of the demijohn, instead of the glass bottle being packed in an outside basket like a carboy, the wicker work is woven right round the outside of the bottle and extends right up to the neck. Demijohns are usually stowed on top of other cargo in such places as beam fillings, etc., and present no difficulties in stowing, as they can be piled up very conveniently by placing the bottoms of one tier between the necks of two bottles of the tier below, and they require no wood in between.

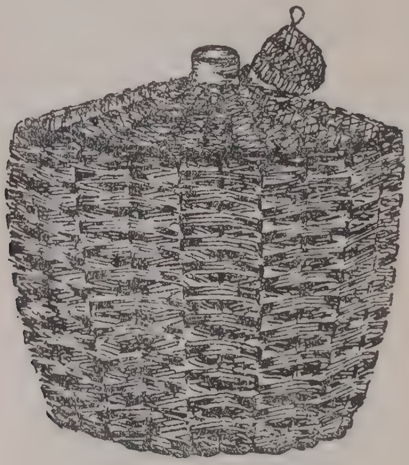


Fig. 17
Demijohn

We have described the necessary stowage of the more frequently used containers, but this does not, however, by any means cover all articles or all commodities shipped as cargo; nor is it possible in a work like this to deal with the stowage of every kind of package or container which might be loaded in a general cargo.

Owing to the many different kinds of packing, which vary enormously both in size and strength, unless described under their particular headings in Ch. II, we must leave our readers to deal with these according to circumstances. We would call their attention to the fact, however, that **once an article is received for carriage it must be well and properly stowed, so as to be delivered in the same good order and condition in which it was received, providing every possible care is exercised within the carrier's power.**

Broken Stowage

The term " Broken Stowage " is generally used in two senses. Firstly, to indicate the space left in a hold because packages do not exactly fill the space allotted to them, and secondly it is applied to small packages or commodities which are used to fill up this empty space.

Broken stowage is a more serious problem than is generally supposed. On the one hand we have the point of view that there is a large portion of the vessel's space which is unoccupied and consequently unremunerative, and on the other hand, if the vacant space is not filled there is always the risk of cargo moving and breaking adrift.

With a mixed cargo the greatest care must be exercised to see that suitable packages or goods are utilised for this purpose ; so that in saving space you will not damage more goods and suffer heavier losses than if the space had been left empty. For example, in stowing a mixed cargo of, say, cased goods including perhaps heavy cases of machinery ; if light crushable cases are used for broken stowage and the ship rolls heavily, these are liable to be crushed almost out of existence, with the result that the cargo starts a serious movement which will develop hourly as long as the rolling continues. We have known many cases of very serious damage having occurred to both ship and cargo from this cause.

One will often find when loading a cargo, similar to the one above-mentioned, that the stevedores will endeavour to level up their working tier with broken stowage of light cases, with the result that very often it is found that the cargo on the next tier has slipped, and crushed the light cases underneath it.

If such cases are used for this purpose, before starting the next tier, all spaces so filled should be well boarded over.

In using these light cases between heavy ones as mentioned above, it is a good idea to visualise the ship lying on her side, as this is a position that one has to allow for to compensate for the heavy rolling which the vessel may experience during a passage.

Another point that has to be considered when selecting small packages for broken stowage is, what the effect on other cargo will be if some of these cases get crushed. For example, we have known cases of milk to have been crushed in broken stowage in the top tiers, and the contents to run down and cause serious damage to fine goods stowed beneath them.

With certain cargoes specific goods are often shipped sometimes at a reduced freight, on the understanding that they are to be used for broken stowage. Amongst such articles we may enumerate the following : horns, hoofs, bones, etc., amongst River Plate cargoes ; deal ends among timber cargoes ; various kinds of seeds packed in " pockets " or small bags, with Indian cargoes ; and railway keys amongst teak wood, from Burma.

With a general cargo there are many small packages of various kinds which may be utilised with safety for broken stowage and beam fillings.

Dunnage

By far the most important factor in the stowage of all cargoes is the question of dunnage, provided the cargo is of such a nature as to require this.

It is impossible to lay down hard and fast rules which would apply to all cargoes and all ships on any voyage ; but this great principle must always be borne in mind, that **the onus is on the ship to provide sufficient and suitable dunnage to prevent damage to cargo ;** not only under ordinary circumstances, but as far as possible provision must be made for any eventualities or circumstances that might occur during the voyage.

The great difficulty is to decide what is " sufficient and suitable " dunnage. Many cases have occurred where claims have been made for damaged cargo due to the insufficiency of dunnage, or to improper dunnage having been used, and in which the verdicts of the courts, either with juries or without, appear most inconsistent.

For example : it has been ruled that the permanent dunnage or wood ceiling laid on the battens on the tank tops is sufficient. In other cases it has been ruled that this is not sufficient dunnage.

The same thing applies to the cargo battens on a vessel's side ; some authorities say it is necessary to have vertical dunnage alongside these permanent battens ; again, others say it is unnecessary. Therefore it remains for those concerned to exercise the greatest forethought in considering this matter of dunnage.

As an example : suppose a vessel loaded with a bag cargo has permanent wooden cargo battens, and has dunnage laid on the tween deck and under the cargo. Now should this vessel through accident or bad weather get water into the hold, if the dunnage was not sufficient to allow the water to run clear of the cargo to the bilges, the ship would in all probability be held responsible for the damage to the cargo on the grounds that it was caused by " insufficient dunnage."

The question naturally arises, What is dunnage ? For the purpose of this work we propose to define this in a general sense by the answer : **" Dunnage is any article that is used for the purpose of protecting cargo from damage by coming into contact with the vessel's structural parts, by adjacent cargo, or by water which may get into the vessel."** Dunnage usually consists of wood, bamboo, mats, burlap, etc., and is provided by the shipowner, unless in a few isolated cases where certain commodities are shipped at a reduced freight on the distinct understanding that they may be used for dunnage.

Owing to the additional cost, which falls on the shipowner, of supplying large quantities of dunnage, we fear that serious risks are frequently taken by stinting its use. In our opinion, however, it is far better to incur a little extra expense in the matter of dunnage, than to take unnecessary risks; for in the event of damage by accident occurring, if the ship is " well dunnaged " it is a great safeguard.

It is not sufficient to have plenty of dunnage if it is not **" suitable and proper,"** as cargo has frequently been damaged by the dunnage itself. Care should be taken to see that all wood or mats are perfectly dry. It is no use taking a casual look at dunnage, as it may perhaps have been in the sun for a few hours and appear dry externally; whereas in reality it may be full of moisture, and when the hold becomes heated, evaporation will take place and damage to cargo may result. Dunnage should always be carefully examined to see that there is no oil or dirt adhering to it, as this would easily damage some cargoes.

The amount of dunnage to be used underneath a cargo is a point upon which we can only comment. We can give no specific instructions, and all those concerned must use their own judgment with regard to the special construction of their vessel, nature and condition of the cargo, and the intended voyage.

The old days when they had certain rules such as 6 inches on the floor, 8 to 10 inches in the bilges, etc., have gone from us, and every ship, every cargo and every trade may probably require different dunnage.

Some vessels are fitted with permanent dunnage on the floors, side battens, etc.; others have none; therefore the only rule which we can lay down is, that **the Master and officers who are responsible for the outturn of the cargo should be perfectly satisfied that the dunnage is " sufficient and suitable,"** and we think that the deciding of the requisite amount of dunnage required can safely be left to any experienced shipmaster—provided he is not influenced by the thought of the cost of the dunnage.

Different cargoes require different principles in connection with dunnage. For example, in most cases it is necessary to place dunnage underneath the cargo to allow drainage of any water to the bilges. On the other hand some cases require the use of dunnage for ventilation or to form a passage for air.

Having mentioned the great importance of providing sufficient and suitable dunnage, we would point out that this is useless unless such dunnage is well and properly laid in the right place. All ironwork in most cases requires to be well covered, and all cargo requiring dunnage at all should be kept clear of iron work, such as tween decks, stanchions, coamings, frames, tunnel casings, etc. This matter must also be left for the people concerned to use their own discretion, as we think that any experienced shipmaster will know how to lay dunnage or direct it to be laid to suit special circumstances pertaining to his ship at the time of loading.

We frequently find, however, that great oversight occurs in the laying of dunnage with certain cargoes. For example, take a cargo which sweats heavily—often one will find cargo battens, etc., in good condition, tween decks and sides of holds well covered, but when it comes to the turn of the bilge it is found that sweat or moisture has run down the ship's side behind the frames as far as the closed ceiling and then right into the cargo. Dunnage should always be laid up and down from above the closed ceiling over the turn of the bilge, to meet the athwartship dunnage on the floors. Special care should also be taken in the tween decks to see that dunnage of sufficient thickness is laid in the wings to allow the condensation running down the ship's side to have a clear run to the scuppers. Many modern vessels are now built with double bottoms and no bilges. This is a difficult class of ship to dunnage properly, and requires special care and attention on the floors to see that any water which may run down the sides from condensation or other cause has a free passage to the well.

Dunnage is also required for separating cargo or for building up and protecting packages in a general cargo, and this should receive special attention to see that it is suitable.

With regard to cargo shipped for use as dunnage, such as horns, hoofs, certain timber, rattans, etc., it is essential to see that these goods in their own turn are not damaged. For instance, say small dholls of coir be used for dunnage and these themselves be damaged through coming in contact with grease or other substance, the receiver would probably not accept these goods and a claim would result.

The importance of dunnage may be realised by the fact that on damage occurring to cargo, surveyors are usually asked to take special note if the cargo was or was not properly dunnaged.

We therefore impress upon all concerned that this matter of dunnage should be given the personal attention of those responsible and not left to others.

CHAPTER II

CARGOES

THE commodities described in this chapter, unless otherwise specified, are usually carried in more or less small quantities amongst other goods forming part of what is termed a "General Cargo."

Owing to the many varying circumstances, such as the size and class of vessel, duration of the voyage, shape and particular packing of goods, and to the nature of some articles, it is impossible in the majority of cases to lay down any special rules for stowage. We, however, give notes of many peculiar features known by us as being applicable to certain goods, and where possible have made recommendations regarding the stowage which we hope will be useful to our readers.

Abalone. A shell fish. The animal is used as a foodstuff amongst Orientals, whilst the shell is used for inlaying lacquer work, etc. Requires no special stowage.

Acetate of Lime. See Lime, Acetate of.

Achiote. A dyestuff the same as Annotto (q.v.).

Acids. See Special Cargoes, page 105.

Aeroplanes. These are usually dismantled before shipment, the lighter parts, such as wings, fuselage, etc., being packed in large light cases. Great care must be taken in handling them, especially when slinging, and the cases should always be slung where marked. Particular attention is necessary in the stowage, as it is absolutely essential that the cases should be stowed on a perfectly level foundation with numerous beds; otherwise even with their own weight cases will become broken or distorted, which usually results in damage to the contents. No heavy cargo should on any account be stowed on top of these cases, and even if light cargo is stowed above them, they should be first well boarded over.

Agar (Agar-Agar). A vegetable gelatine produced from a red seaweed and put to various uses. Usually carried in bales which require no special stowage.

Agate. A hard semi-precious stone, used for jewellery. Carried in small quantities, it should be given stowage in a safe place.

Agricultural Material. This is usually packed, part in cases, part in crates; and some parts, such as wheels, shafts, etc., are often shipped without packing. These goods, being of irregular shape and varying weights and sizes, require special attention when being stowed to see that they are well secured and protected, otherwise damage may result from breakage, chafage, etc.

The heavier articles such as tractors, iron frames and wheels, should be stowed below the lighter ones such as shafts, spouts, etc.

Ajowan. An aromatic Indian seed used in cooking and medicinally. It is the source of the antiseptic "thymol" and gives Ajowan Oil. Carried in bags, it should be given stowage as for Seeds (q.v.).

Alabaster. A translucent form of gypsum used as an ornamental stone. Stowage as for Marble (q.v.).

Albin. A mineral of a flaky nature, usually shipped in cases. Stowage as for Mica (q.v.).

Albumen. This is a substance that occurs in living bodies such as the white of egg. Great quantities of dried albumen are prepared from eggs in China and imported into the U.K. and used for many purposes, such as fixing colours, calico printing, etc.

It is variously packed in cases, casks and bags. Black Albumen is usually in bags, and Blood and Egg Albumen in casks or bags. Requires no special stowage.

Albuminoid. Substances resembling albumen, such as gelatine, and carried in bags, which require ordinary bag stowage.

Alcohol. See Inflammable Liquids, page 194.

Alfa. The Arabic name for Esparto Grass (q.v.).

Alfalfa. See Lucerne seed.

Algaroba. The Spanish name for Carob (q.v.).

Alizarin. A Dye. Stow as for Dyestuffs (q.v.).

Allspice. The berries of a shrub cultivated chiefly in the West Indies. Also known as Jamaica Pepper. It is packed usually in bags and requires stowage as for Spices (q.v.).

Almonds. These are usually packed, shelled, in bags, bales, barrels and cases, which should be well dunnaged and protected against moisture. Edible almonds of best quality must be carefully protected from taint. For Almond Oil, see Vegetable Oil, page 143, and Poisons, page 181.

Aloes. These are obtained from the evaporated juice of the aloe shrub, and have a dark resinous appearance and a bitter taste. They are generally packed in cases, but sometimes in bags and mats, and should not be stowed amongst dry or valuable goods.

Alum. A white transparent mineral substance of acid taste, much used in dyeing, and in medicine as an astringent. It should not be stowed amongst dry or perishable goods, as it quickly absorbs moisture, especially on long passages. It is variously carried in barrels, kegs or cases, and sometimes in tins, packed in dry casks. Stow according to packing.

Alumina. This is earthy material, an oxide of aluminium, derived from granite rocks. Mixed with silica, it forms clay and is used for a variety of purposes Carried in bulk and casks, —requires no special stowage.

Aluminium. A metal that is never found in the native state, but is now produced by electrical processes from bauxite.

It is shipped in a great variety of forms, largely as ingots, sheets in cases and powder packed in casks or boxes. Aluminium ashes are packed in bags, and the wire in coils. Requires no special stowage, but when shipped as ingots they should be stowed to avoid breakage, which often occurs.

For Aluminium Torches, see page 183.

Amber. A hard and brittle substance, being the hardest known resin, having a lustre varying in colour, and is much used in the manufacture of beads, cigarette holders, etc. It is found principally on the shores of the Baltic. Generally packed in cases of varying sizes, it should be stowed as Precious Cargo (q.v.).

Amboyna Wood. See Timber, page 166.

Ammonia. See Dangerous Cargo, page 177.

Ammonium Nitrate. If packed in drums or strong casks requires no special stowage.

Ammonium Sulphate. This is a crystalline solid, a bye-product of the gasworks, largely used as artificial manure, and is a cargo that requires special attention. It is not dangerous, but from the nature of its source would be crude and mixed with many products of tar, giving it distinct taste and odour. It is almost certainly hygroscopic, will soak into wood, and is very soluble in water.

Recently the case occurred of a vessel which, after discharging a cargo of sulphate of ammonia, was to load a wheat cargo. To prepare the holds, which were then unfit for loading, the Master had them whitewashed, and then loaded the wheat. When discharging it was found the whole cargo was tainted by chemical action caused by the lime and ammonia, as this produced ammonia gas, which would affect anything in the same hold.

Ammonium Sulphate would be usually shipped in bulk and sometimes in bags. After discharging it, the holds should be thoroughly washed out with water, when all trace of the cargo will be removed. Without thorough washing and examination of the holds, foodstuffs should not be carried after ammonium sulphate.

Angelica. A herb of which the berries are used for making medicines. Stowage as for Herbs (q.v.).

Angola Waste. See Waste (Cotton).

Angora Hair. See Hair.

Animi. This is a hard gum. For stowage, see Gum.

Aniline. See Dangerous Cargo, page 184, and Oils, page 142.

Aniseed. The seed of the anise herb, used as a flavouring in confectionery. It is carried as a light seed in bags, and should be stowed in a dry place and away from other cargo that might be damaged by its taint.

Star Anise is also shipped under this name.

Aniseed Oil. The oil extracted from the anise herb. (See Oils, page 144.)

Annotto (Arnotto). The fruit capsules of an American tree from the berries of which a yellowish red colouring matter is made, much used as a dye for silk and to intensify the yellow. Also used as a colouring for butter and cheese. Spanish Annotto comes from Brazil and French from Cayenne.

It is usually carried in casks in its moist state, and should be stowed accordingly.

Anthracite. A non-bituminous kind of coal containing a large percentage of carbon. (See Coal, page 114.)

Anthraquinone. A substance used in the manufacture of Dyes (q.v.).

Antimony. This is a metal that is a chemical element. It is variously shipped as Antimony Oxide, Salts, and Sulphide, which latter is used in vulcanising rubber. Antimony Oxide is shipped in casks and is much used as a substitute for paint. The ore is sometimes carried in bulk but usually in casks, boxes and bags. If carried in bags they must be carefully examined to see that they are not perished. No special stowage is required.

Apothecary Ware. See Chinaware or Glassware.

Apples. See Fruit, page 122, and Refrigerated Cargo, page 155.

Apricots. See Fruit, pages 125 and 155.

Arachides. These are Ground Nuts (q.v.).

Archil (Orchil). A purple dye obtained from several plants which since the discovery of aniline dyes is not much carried. Archil weed should not be stowed near damp goods, as it will absorb moisture from them.

Areca Nut. This is the " Betel Nut " of the tropics, obtained from the Areca Cathecu Palm. The natives use it mixed with pan leaf and chunam or lime as a masticator. When green, and shipped in baskets or bags on long passages, damage is often caused to other articles by its heating properties, and it also gives off a dangerous gas fatal to animal life. Areca is usually shipped in small quantities, and requires to be stowed where plenty of ventilation is available during the voyage.

Argol. See Tartar.

Arrack (or Toddy). Any spirituous liquor locally made in the East, more especially that distilled from several palm juices. Usually carried in casks or kegs, or bottled in cases, it should be given stowage as for Alcoholic Liquors (q.v.), page 112.

Arrowroot. A herb found largely in the West Indies, tropical America and other places, from whose roots a very pure starch is obtained. Also much used as a fine jelly for invalids. Shipped variously in tins, bags, boxes, cases or barrels, it should be stowed as foodstuffs, in a dry place, free from any smell.

Arsenic. A crystalline substance of grey colour possessing metallic lustre. It occurs sometimes in the free state, but more frequently in combination with many ores and minerals called arsenical metals. It is used in dyes, fireworks, sheep dips, weed killers, rat poisons, etc. The compounds of arsenic are dangerous to animal life. It should be given stowage well away from articles of an edible nature and marked "POISON." Sometimes carried in bags, but usually packed in cases, it should be carefully stowed and handled to prevent breakage and leakage. See also Poisons, page 181 and page 107.

Asafœtida. A gum-resin known as "Devil's Drug," and is shipped from the East as a medicine and dyestuff in bags and boxes, but often in skins and baskets. It has an unpleasant taste and a nauseating smell, which often remains for some time after the stuff has been discharged. Packed in bags and boxes in dry lumps, it should not be stowed anywhere near foodstuffs or cargo that would be affected by the smell, and should be given special separate stowage if possible, such as in a poop space, etc.

Asbestos. A valuable silky fibrous material much used for its fireproof qualities. When clean it has no objectionable features.

It is shipped in many ways: as cement in double bags, as crude asbestos, and as packing in bags, bales, rolls, and cases. When shipped as millboards in sheets in crates they should be stowed on edge in top stowage with no weight on them

Ashes. Many kinds of ashes are carried in bulk, bags and casks. They should be kept dry and away from damp goods, but otherwise require no special stowage.

Aspenwood. See Timber, page 167.

Asphalt. There are two kinds: one found as rock asphalt, and the other consisting of bitumen and earthy material used as a paving medium and for many other purposes.

Shipped largely from the Gulf of Mexico and Trinidad in bulk and in barrels. When carried in bulk the vessel's holds must be properly cleaned. It is advisable to whitewash them previous to loading, as the asphalt often runs together, and causes much delay and expense in discharging. In many cases it has even been necessary to pick it out.

When shipped in barrels it is advisable to put loose dunnage between them. Some asphalt is carried in a liquified form in barrels and requires special consideration. This article is more or less inflammable.

Asphaltum. See Asphalt.

Attar of Roses. Rose Oil—the most valuable of all essential oils used in perfumery. See Essential Oils, page 144.

Automobiles. Shipped in cases, which should be stowed in holds having the largest "square" spaces to avoid broken stowage. Care should be taken to see that they are stowed on a flat surface on level beds to prevent distortion of the cases, which often occasions serious damage to the automobiles they contain. If stowed in large numbers boards should be laid between each tier, so as to distribute the weight of each case over more than one case beneath it. Light cases or other goods may be stowed on top of these cases, but if broken stowage is needed between cases, great care should be exercised as to what cargo is used for this purpose, and only strong cases, lumber or similar goods should be employed. Serious damage has often been caused to light goods which have been used for this purpose, and heavy claims resulted.

Awabi. See Abalone.

Babbits Metal. This is a mixture of metals, usually tin, copper and antimony, and being an anti-friction metal is used for the lining of brasses of bearings. It is usually carried in cases or ingots, and requires no special stowage.

Bacon. The flesh of the pig after being cured and smoked. It is usually shipped in cases and casks of varying sizes, and sometimes on short passages in linen and paper packings. It should be stowed in a cool dry place, and if shipped in light covering only, special care should be used to prevent damage by pressure from other heavy or rough cargo. If shipped packed in salt, in cases, care must be taken that these are not stowed above dry goods, as salt will sometimes absorb moisture, leak out, and damage other cargo.

Bajra (Bajre, Bajury, etc.). An Indian pulse—a variety of Millet-seed. Stowage as for Seeds (q.v.).

Balata. This is a substitute for gutta-percha made from a gum found in tropical America. Stowage as for Gutta-Percha (q.v.).

Bale or Fine Goods. Bales containing fine goods such as are largely exported from Manchester are of various shapes and sizes. They should be given careful stowage, kept thoroughly dry, well ventilated, and with marks and numbers upwards if possible without affecting good stowage. The lower tiers of bale goods should be carefully dunnaged with level dunnage, or the bottom bales are liable to be cut with pressure.

These packages usually contain articles of considerable value, and every precaution should be taken to prevent damage especially from chafage, or staining by wet or greasy substances, or by handling with hooks.

Balsa. See Timber, page 167.

Balsams. These are plant exudations used in medicine and are really medicinal resins. The most important are Balsam of Tolu, Balsam of Peru, Canada Balsam (or Canada Turpentine), Balsam of Copaiba (or Capivi), Benzoin (or Gum Benjamin), Castoreum, Jalap, Gurjun, Storax, Palembang Benzoin, etc., etc. Generally speaking all of these may be shipped as liquids, but if the essential oil has been evaporated, then as solid Resin (q.v.) for stowage. Castoreum, Storax, Balsam of Peru and Benzoin are usually shipped as the resin, whilst Balsam of Copaiba, Canada Balsam and Gurjun are nearly always shipped as the balsam in barrels, kegs, drums or tins and, being valuable, require careful stowage.

Bamboos. These are the stems of the bamboo plant, and should not be stowed under heavy cargo as they are easily split.

The male bamboo, however, is quite strong and not readily broken.

Bananas. See Fruit, pages 125 and 157.

Barbed Wire. See Wire, Barbed.

Barilla. An impure soda obtained from the ash made by burning a marine plant. Usually shipped in cases or kegs, it should be stowed away from foodstuffs.

Barjari. See Bajra.

Bark. There are many kinds carried, and they are shipped in bulk, bales, bags and sometimes hogsheads. They may generally be stowed with dry goods when free from smell or insect life. Stow well away from articles of an edible nature. The finer kind of bark should be kept away from oily, damp or strong-smelling articles, as they may be damaged by contact. Hemlock-bark requires to be well protected from rain or wet, as it is easily damaged. All barks should be protected from salt water. Bark Extract is also shipped—see Extracts.

Barley. Stowage as for Grain (q.v., page 128.)

Barol. See Oils, page 142.

Basils. These are strips of the skin of a bullock's belly. They make a poor quality leather, and are used in filling or building up the heels and other parts of footwear. Usually shipped in bales or trusses; they require no special stowage except that they must be kept quite dry.

Bast (Bass). The inner bark of certain trees used for making mats and soft baskets and also used to tie up small shrubs. Usually shipped in bales, it requires no special stowage.

Bauxite. An earthy mineral found in South France, and is of varying colours according to the proportion of iron it contains. It is an ore of aluminium, usually carried in bulk, and requires no special stowage.

Bay Berries. See Berries.

Beans. There are many kinds, such as Haricot, Butter, Locust, etc. They are usually shipped in bags, which should be well dunnaged and matted, and given good dry stowage away from any goods such as turpentine, oil, etc., from which they would be liable to be damaged by taint.

Beaver Boards. These are usually shipped with a heavy cardboard covering, but are sometimes in light cases or crates. They should, if possible, be stowed in blocks of their own in an upper deck on a good level bed to prevent buckling and distortion. If carried in a lower hold, they should be put in upper stowage and on no account have any weight stowed on them.

Bêche-de-Mer (Trepang). These are a species of large sea slug of varying lengths and are a favourite food with the Chinese. They are packed in sacks when they are crisp, but gradually get soft like india-rubber and often give off a disagreeable odour which may damage other cargo; so isolated stowage should be arranged if possible.

Beef. Salt beef is not much carried nowadays. When shipped it is usually packed in casks, which should be treated as moist cargo and stowed to avoid damage to other cargo if the casks leak.

Beef is now carried in increasing quantities in a frozen or chilled condition, for the stowage of which see Refrigerated Cargo, page 151.

Beer. See Alcoholic Liquors, page 112.

Beeswax. See Wax.

Benzoin (Benjamin). A gum resin which is used in producing incense, in making benzoic acid, etc. It is carried in cases, and requires stowage in a cool place.

Bere. A Scotch Barley. For stowage see under Grain, page 128.

Berries. There are several kinds of berries carried. It depends entirely on the nature of the berry, as to how it is packed or stowed, but they are usually shipped in bags and require no special stowage.

Betel Nut. Another name for Areca Nut (q.v.).

Bicarbonate of Soda. See Soda, Bicarbonate of.

Bigg. Winter Barley. For stowage see under Grain, page 128.

Billets. See Iron and Steel.

Biscuits. These are usually packed in sealed tins or packets in cases, which should be stowed in a dry place, as foodstuffs, and not near any other cargo from which they could be damaged by taint. Sometimes larger quantities are stowed in dry casks, and these should be stood on end in top stowage.

Bitterwood. See Timber, page 167.

Bitumen. This comprises a number of natural inflammable liquids, solids and semi-solids, such as Maltha (mineral-tar), Mineral Naphtha, Asphalt and Heavy Flux, variously carried in casks, barrels, drums, cases, etc.

When in the solid or semi-solid condition should be given stowage as for Asphalt (q.v.). When in the liquid state stow as for Petroleum (q.v.), page 139.

Bitumen Enamel. This is carried solid in casks, which should be given good cask stowage in a cool place.

Bizmuth, Metal. This is usually shipped in bars and in bags as ore, and requires no special stowage.

Blachan (Balachong). A Chinese condiment—no special stowage required.

Blacklead. The usual name given to Plumbago and Graphite. It is generally shipped in casks, but also carried variously in cases, cans, bags and boxes, and should be stowed away from goods liable to be damaged by dust escaping through the staves of the casks. It should not be stowed in close proximity to oil on a long voyage, as it is liable to spontaneous combustion.

Blacksheets. These are thin sheets of iron, and are usually packed in thin metal envelopes and should be stowed solid on their flats well clear of hatch squares. This cargo is very liable to damage from water, and great care should be taken to prevent it getting wet, especially when loading, as this will cause heavy rust on the sheets.

Blackwood. See Timber, page 167.

Bladders. Bladders are casings used to cover cheeses, and are usually packed in barrels. See Casings.

Bleaching Powder (Chloride of Lime). Usually made from chlorine gas and cold slaked lime, and is much used in making chloroform, as a disinfectant, and for its whitening properties. Generally shipped in casks, cases or jars, it gives off a strong gas, and should never be stowed near dry or choice cargo, as some bale goods will be damaged by the vapour alone. It is rendered useless by contact with water or strong sunshine.

See also Dangerous Cargoes, page 185.

Blende. This is one of the principal ores of zinc. Stowage as Ores (q.v.) page 148.

Blue. A blue-coloured powder used in laundries to impart a blue tint to white goods. Variously packed in cardboard boxes, cases and sometimes in kegs, it requires no special stowage.

Bog Ore. Or Bog Iron Ore, is an ore of iron found in boggy or swampy land, and is a hydrate of iron. As a mineral, it is carried in bulk and requires no special stowage.

This ore is used in purifiers to absorb sulphur. Ore which has to be soused requires special treatment before shipment, and a certificate of safety should be demanded.

It is advisable to stow away from crew's quarters.

Bolts and Nuts. These are shipped in various packings such as casks, cases and rough bags, which depends entirely on the size and class of the bolts and nuts. They can be well utilised as rough broken stowage anywhere. These goods require to be carefully handled as, owing to the heavy weight of the contents, bad usage will cause the packings to burst and contents suffer loss.

Bones. Shipped in cases, bags and also loose, they are often carried at a reduced freight and used for broken stowage and filling into places such as peaks, tanks and behind cargo battens, etc. If stowed in compartments with other cargo liable to be damaged by taint or moisture it should be ascertained if they are perfectly dry and sweet, otherwise damage may occur by overheating, or the odour may contaminate other cargo.

Bone Meal. A preparation from bones ; usually shipped in bags, it has a slight odour and also creates a great dust over nearby goods when loading or discharging. If the bags are inferior or second-hand, the bill of lading should be so endorsed. In discharging the bags should be carefully handled, as they rot very easily on the passage, and they are often found burst, allowing the loose bone dust to mix with other cargo. Stow as for ordinary bag cargo and ventilate as much as possible.

Books. If valuable, they are usually packed in tin-lined cases, and should be stowed amongst dry goods only. Booklets are often shipped in bags and sometimes in bales. If the edges are chafed serious damage may occur.

Boots. See Footwear.

Boracic Acid. Sometimes called Boric Acid. Obtained from volcanic steam jets, it is largely used as an antiseptic and as a preservative. It is usually shipped in powder in casks, kegs and bags, and sometimes in bottles in cases for medical purposes. Stow according to packing, as a foodstuff.

Borate. A double borate of sodium and calcium shipped in sacks. Stowage as Minerals, page 148.

Borate of Lime. See Lime, Borate of.

Borax. A transparent compound of boracic acid and soda, used for many purposes. It is usually shipped in bags, casks and cases, which should be stowed with dry goods according to packing, as a foodstuff.

Botargo. This is a relishing food made from mullet roe. Requires no special stowage.

Bottles. See Glass Bottles.

Boussir. An Indian chaff pressed and baled and used as a camel food. No special stowage.

Boxwood. See Timber, page 167.

Bran. An offal produced during the milling of wheat, being the outer coating of grain, and used as a food for cattle and horses. Usually shipped in bags, it requires ordinary bag stowage.

Brandy. See Alcoholic Liquors, page 112.

Brattice Cloth. This is a waterproofed heavy canvas mostly used as screens in coal mines. If untarred it is non-inflammable and may be stowed as desired.

For tarred Brattice Cloth a certificate should be obtained from the manufacturers that the cloth has been properly dried.

Brazil Nuts. The seed of a tall tree. In addition to being used as food they yield oil, much used in cooking and by artists and watchmakers. Usually shipped in bags, which must be kept cool and given ordinary bag stowage.

Brazil Wood. See Timber, page 167.

Briarwood. See Timber, page 167.

Bricks. Bricks are usually stowed in a solid block with straw, dunnage or matting to separate them from other cargo. They should be stowed evenly and handled carefully to avoid excessive breakage.

Under certain conditions bricks absorb a certain amount of moisture.

Brimstone. See Sulphur.

Briquettes. A patent fuel made of various substances such as coal-dust, saw-dust, pitch, resin, etc., and moulded into blocks the shape of bricks or ovoids. They should be stowed solid and given plenty of ventilation, as they often have a strong odour, so should not be stowed near any article liable to be damaged by taint. In hot weather they lose a small amount of weight.

Bristles. These are strong hairs obtained from the backs of animals, especially pigs. Used for paint brushes, boot making, saddlery, etc. Packed in barrels and cases; requires no special stowage. Bristles for brooms are usually carried in bales and bundles.

Brushware. These articles are made in so many varieties that is it impossible to define any method of stowage, except that they must be stowed in a dry place, otherwise the glue of the brushes will be affected; also in the case of long brooms or brushes with long hair they must be stowed flat or damage may occur.

Bucha Leaves. See Leaves.

Buckwheat. A farinaceous food similar to oatmeal. Usually packed in bags, packets or cartons. Stowage as for Oatmeal (q.v.).

Bulbs. A vegetable root carried in considerable quantities (especially from Holland). Shipped in cases, usually packed in seed husk, they should be carefully handled and stowed in a dry cool place.

Bullion. See Precious Cargo, page 150.

Burlap. A light kind of sacking manufactured of jute and used for making light bags, separation cloths, and for many other purposes. Shipped in rolls packed in bales, it requires no special stowage.

Butter. Carried sometimes in blocks, paper wrapped, and packed in cases, but more often in kegs. These must be handled with care and stowed in the coolest possible place.

Butter must be kept well away from cargoes such as turpentine, tar, bones, etc., which would damage it by taint.

For the carriage of butter in a frozen condition see Refrigerated Cargo, page 151.

Cable (or large chain). This should be stowed athwartship on the skin of the vessel in the lower hold if possible. If evenly stowed it should make an excellent base upon which to stow heavy general cargo.

Cable (Electric). Lead or rubber covered cable wound on drums, the larger of which generally weigh several tons and require careful handling and stowage. They should be stowed on the skin of the vessel or deck, and fore and aft if possible. If not blocked off with other cargo, they should be well lashed, as if the drums start working during the voyage considerable damage may be done to the surrounding cargo.

Cable (Submarine). This is usually coiled down in a special tank erected in the hold, after which the tank is filled with lime water. Care should be taken to avoid damage to other cargo in the event of the tank leaking.

Cacao Butter. See Vegetable Fats, page 145.

Cadmium. A metal which is carried either in the sulphide form as powder, or in small sticks of metal, and is used as a yellow colouring matter. Requires no special stowage.

Caffeine. This is an alkaloid prepared principally from tea waste or refuse and is a useful drug. Usually carried in cases, it requires no special stowage.

Cajuput. See Essential Oils, page 144.

Cake Lac. See Lac.

Calamine. An ore of zinc which is used in the form of ointment or lotion for skin diseases. Stowage according to packing.

Calcium Chloride. This is not a dangerous article if properly packed in airtight drums, and should be stowed in a dry airy place in a deck away from any foodstuffs and acids. It is usually shipped in barrels or iron drums and care should be exercised to see that the barrels are not leaking before shipment. They require careful handling and stowage according to the method of packing, remembering that this substance absorbs moisture from the atmosphere and will liquify.

Calcium Hypophosphite. Not to be confused with 'Hypo' (q.v.). Is the chief agent for "phosphites." See Chemicals, page 113.

Calcium Silicide. Used in metallurgy. Should be packed in metal drums and stowed in a dry place.

Calumba (Colomba, etc.): The root of a plant used in medicine as a bitter tonic. Stowage as Drugs (q.v.), page 113.

Camata (Camatina). Acorns which when more mature are called Valonia (q.v.).

Cameline. A South European plant known as treacle-mustard, or worm seed, and used medicinally. No special stowage required.

Camphine. Stow as for Turpentine (q.v.) page 146.

Camphor. A white crystalline substance from the camphor tree. It is used for medicinal purposes, and is added to illuminating oil to increase the brightness. A large quantity is shipped to Europe from China and Japan in casks, cases and drums. It should be stowed in a perfectly dry place, and great care must be taken when allotting space for the carriage of camphor, as the odour is so pungent that it is liable to damage other cargo to a great extent. Camphor is highly inflammable. See also Oils, page 147.

Camphyline. This is a Disinfectant (q.v.).

Camwood (Barwood). See Timber, page 168.

Canada Balsam. A kind of turpentine containing oils and resin, largely used as a transparent cement, in particular in microscopy. It has a bitter taste and peculiar smell, and should not be stowed with goods liable to be damaged by taint. Usually carried in casks, requires stowage as for Turpentine (q.v.) page 146.

Canary Seed. See Seed.

Candied Fruit. Such as plums, apricots, etc., which are stoned and boiled in white sugar, when they become sugar coated. Peel is made in the same way. Stow in a cool dry place and away from any cargo that gives off odour.

Candles. These are usually packed in light wooden boxes and should be stowed in a cool dry place, and not between heavy goods. Owing to the frail nature of these cases, care should be taken in their handling, and they should be hoisted on boards or trays in loading and discharging.

Canella. The inner bark of the Canella tree, much used as a tonic, an aromatic, and by the West Indian natives as a spice. The orange-coloured bark is sometimes called " Wild Cinnamon." It is usually exported in casks and cases, some flat and others rolled in quills, similar to Cinnamon (q.v.) for stowage.

Canes (Malacca). These are the stems of the malacca palms and are much used as walking sticks. They are usually shipped in bundles, those from China generally containing about 500 canes each. No special stowage required.

Canned Goods. This covers all canned meats, fish, fruits, jams, etc. They are usually shipped in cases varying considerably in size and should be given good square stowage if possible, or they may be used as good beam fillings or broken stowage, providing they are carefully placed. Precautions must be taken to prevent pillage of these goods. Many canned goods are packed in frail and light cases which require careful handling, otherwise many packages are broken and risk of pilferage increased. They should be worked on boards or trays where possible.

Cantharides. Generally called " Spanish Fly," which is formed by crushing the beetle, and is used in medicine. It is a poisonous substance and has a nasty sickly smell. Usually shipped in casks and cases in small quantities which should be kept well clear of foodstuffs. Stowage as for Drugs (q.v.), page 113.

See also Poisons, page 181.

Canvas. All canvas material should be kept quite dry or it will quickly rot. Care should be taken to stow it clear of any iron such as stanchions, etc., to avoid damage by staining. Usually packed in bolts of about 42 yards which are bound into bundles or bales. Canvas should be protected against chafage and damage by hooks.

Caoutchouc. This is raw rubber; that is the crude product from the rubber tree, and is shipped solidified. Stowage as Rubber (q.v.).

Capers. Flower buds of the caper tree. Sometimes pickled in vinegar and used to make sauce. Usually shipped in small quantities, in kegs or bottles, but packed in cases if pickled. Stow according to packing.

Capsicum. This is pepper used in food production. Stowage as for Chillies (q.v.).

Caraway Seed. See Seed.

Carbolineum. See Oil, page 142.

Carbon. See Charcoal.

Carbon Black. See Lampblack.

Carbon Papers. See Dangerous Cargoes, page 187.

Carborundum. This is a silicide of carbon and a very hard substance used as an abrasive and made into grinding wheels, etc. Requires no special stowage.

Cardamom (Cardamon, Cardamum). An East Indian herb used in preparing stimulants that has rather a pleasant odour. Packed as light dry seeds, usually in bags, but often in cases, and should not be stowed near tea or articles of an edible nature.

Cardboard. Shipped in various ways, such as bundles, bales, cases, etc., and requires no special stowage except that it must be kept dry and stowed on a flat surface to avoid distortion.

Carmine. A red colouring matter from the Cochineal insect and used as a Dyestuff (q.v.).

Carobs (Locust Pods, Algaroba, etc.). These are pulpy pods of the carob shrub, used as a food for cattle and shipped in small quantities from Mediterranean ports. Sometimes carried in bulk, but usually packed in casks and bags, they require no special stowage, but should be well ventilated.

Carpets. Carpets are usually shipped in rolls or bales, and being valuable should be given special stowage in a clean dry place. They should be well dunnaged and protected, and properly blocked off to prevent chafage against the vessel's sides, stanchions, beams, etc.

Carthamus Seed. See Seeds.

Casein. An important substance obtained from the milk of various animals; much used in making ivory handles for knives, in soap-making, and in many medicinal foods. It is valuable and largely shipped in sacks, which should be given good dry stowage as described for bag cargo, page 16, and occasionally in tin-lined cases from New Zealand and the Argentine.

Case Oil. See Oils, page 135.

Cashew Nuts. The kidney shaped fruit of a small tree whose shell contains black oil which is used to protect timber from white ants. The tree exudes a gum similar to gum arabic. Usually carried in bags in small quantities, they should be kept away from any cargo liable to be damaged by oil; otherwise they require no special stowage.

Casings. Casings and "guts" are the terms applied to the entrails of cattle, sheep, pigs, etc., the different parts being known commercially as runners, middles, bungs, bladders, and throats or weasands. They are generally shipped wet in casks, but sometimes dried in cases, and require ordinary cask or case stowage.

Cassava. A foodstuff, the root of a tropical shrub. See Manioc and Tapioca.

Cassia. A great number of varieties of this tropical plant exist. The herbs give some medicinal substances, one of the best known being senna. Cassia buds are like cloves and used in confectionery. Variously shipped in bales, bundles, bags and cases, they should not be stowed with any other cargo liable to be damaged by the scent. If shipped in 1 or 2 lb. mats, they can be used as beam fillings. When carried in bags this article is very bulky. Cassia oil is prepared from the leaves and green twigs and is an Essential oil (q.v.) page 144

Castor Seed. The castor oil plant. Shipped in the form of seeds and cake in bags and castor oil in drums, tins, and cans. Stowage as for Seeds (q.v.) and Vegetable Oil (q.v.) page 143.

Castoreum. This is brought largely from the Hudson Bay and used as a medicinal preparation and in perfumery. Stowage as for Drugs (q.v.) page 113.

Catechu. Another name for Cutch or Gambier (q.v.).

Catgut. This is a strong string made from animal intestines and used chiefly for musical instruments, etc. Shipped usually in cases, it requires no special stowage.

Cattle. See Live Stock, page 134.

Caustic Soda. See Dangerous Cargoes, page 188.

Caviare. A food delicacy prepared from the salted roe of the sturgeon and other large fish and exported principally from Russia. Usually shipped in kegs and tins, it requires no special stowage.

Cedar Slats. See Timber, page 168.

Celery Seed. See Seed.

Celluloid. See Dangerous Cargoes, page 188.

Cement. This includes the following articles, some of which are included under their individual headings : Concrete, Flooring Plaster, Mortar, Plaster of Paris, Portland Stone, Roman and Scott's cement. It is usually shipped in bags and casks, and when in casks great care is required in handling and stowing as the casks are usually frail and with the contents being so heavy they are easily damaged and contents lost. In stowing not more than nine tiers should be allowed or much "crushing" will result. Cement should never be stowed with ammonia Any adjacent cargo liable to be damaged by the dust caused during the working of cement should be covered up.

Cerasin. A gum from the cherry tree. Stowage as for Gum (q.v.).

Ceresin (Ceresine). See Oils, page 142.

Chalk. White fine grained rock. Much used in making Portland cement, plaster, mortar, and crayons of all kinds. Usually carried in bulk, but sometimes in casks and cases, it requires no special stowage.

Chank. This is the name for a species of shell some of which are valuable. If clean and dry and have no odour they require no special stowage.

Charcoal. A form of carbon made from the charred wood of some trees, such as the willow, maple, oak, etc. It is usually carried in bulk or small quantities in bags, and is liable to spontaneous combustion. The charcoal dust will damage other goods during loading and discharging if they are not protected. It is said to absorb about 20% of moisture during a voyage.

Chasam. Silk waste from the mulberry silk and packed in bales. Stow as for Silk (q.v.).

Cheese. An article of food made from milk. Cheeses are made in different sizes and carried in boxes, crates, bags, or loose. If loose, it is advisable to lay boards between each tier, and care should be taken to keep it cool and away from cargo liable to damage it by taint. A vast quantity of cheese is now shipped on long voyages, for which see Refrigerated Cargo, page 154.

Chemicals. See Chemicals and Drugs, page 113.

Cherries. These are variously carried: dried in barrels, canned in cases, etc. Stow according to packing.

Chicle. A gum from tropical America used as a masticator and as a substitute for gutta-percha. It is carried in the form of cakes in bags. Stowage as for Gum (q.v.).

Chicory. The root of the chicory herb, dried, ground and roasted, much used as a cheap mixture with coffee, and has a certain value as food. Packed in bags, casks and cases, it must be kept thoroughly dry or it will quickly turn mouldy. Requires no special stowage.

Chile Saltpetre. See Nitrate of Soda.

Chillies. Fruit pods of a herb used in making various condiments and usually shipped in bags and baskets. In the dried state, in bags and sometimes bales, they require no special stowage. Green chillies are shipped coastwise in the East in baskets and require plenty of ventilation.

China Clay. A white clay used in manufacturing porcelain, paper and many kinds of powders. It is usually shipped in bulk after being in kilns, and a large quantity is used in the United Kingdom and shipped coastwise. Sometimes the extra dry china clay is shipped from the West Coast of England in casks to the U.S.A. and Italy. It requires no special stowage, but the dust, being of a greasy nature, will damage other cargo if this is not protected when working it.

China Root. The root of a plant used in Japan and China in preparing a tonic, but which is now exported as a dyestuff. Usually shipped in bags and casks, it requires no special stowage.

Chinaware. All chinaware requires to be carefully handled to avoid breakage. Usually packed in straw in crates, but sometimes in barrels and cases. No heavy weight should be stowed on top; otherwise this cargo requires no special stowage.

Chiretta. A dried plant used medicinally. Generally packed in bales, it requires no special stowage.

Chloride of Lime. See Bleaching Powder.

Chocolate. This is prepared from the bean of the cacao tree. It is usually shipped in tins or cases, which must be stowed in a dry cool place and kept free from cargo liable to taint the chocolate.

Chow-chow. A Chinese preserve, usually shipped in cases which contain from 6 to 24 jars. These cases should be stowed marks up, or the syrup may run out and damage other cargo. They should be given good upper stowage and well blocked off.

Chrome Ore. See Ores, page 148.

Chunam. Eastern name for Lime (q.v.).

Churrah. A peculiar resin extracted from the hemp plant and shipped only in small quantities. Requires no special stowage.

Cider. See Alcoholic Liquors, page 112.

Cigarettes. These are usually packed in tin-lined cases containing packets or tins and require no special stowage except that they must be kept dry.

Cigars. Stow as for cigarettes. On long voyages they should not be stowed near articles of an edible nature.

Cinchona. Called also Peruvian or Jesuit's bark. It is a dried bark, and on account of its containing quinine is used for medicinal purposes. Usually packed in bales, requires stowage as for Bark (q.v.).

Cinnabar. Sometimes called Vermilion, also red Sulphide of Mercury. This is the ore from which Mercury is almost wholly obtained. Also used to make vermilion pigment, and to colour sealing wax red. Usually shipped in bags, it requires stowage where it will not get damp or be subjected to undue pressure. It is a poison, so must not be stowed near foodstuffs.

Cinnamon. This is the bark peeled from the shoots of the cinnamon tree and rolled into quills and dried. Thicker pieces are carried in chips. The peculiar smell is due to the oil of cinnamon, which is an Essential Oil. Usually packed in Ceylon in bags, it is a valuable cargo and should be stowed as choice freight, and away from articles of foodstuff on account of its aroma.

Citrons. These are a form of wild orange. They are preserved and packed in cases and require no special stowage.

Civet. A substance used in perfumery which when undiluted has an offensive smell and must consequently be stowed well away from any articles liable to be damaged by it.

Clays. The following are largely carried and are described under their respective headings: Fuller's Earth, Marl, Ochre, Pumice Stone, Sienna, and Umber.

Cloth Goods. Such as wearing apparel, household articles, rolls of cloth, etc., manufactured and otherwise. They are packed in bales or cases, and require no special stowage, but must be kept dry and away from oily or damp articles.

Clover Seed. See Seeds.

Cloves. The flower buds of a tropical tree which are gathered before they open and dried in the sun. The Oil of Cloves which evaporates quickly is found largely in the unopened buds and is an Essential Oil (q.v., page 144). Variously packed in cases, mats, bundles and bales, they should be given good stowage as spices, well away from any liquid, as they will absorb moisture.

Coal. See Special Cargoes, page 114.

Cobalt. This is ore used in preparing alloys of copper and pigment for colouring pottery, etc. See Ores, page 148.

Coca. The dried leaves of the Coca tree from which the local anæsthetic cocaine is obtained. Shipped only in small quantities. should be stowed as Drugs (q.v., page 113). See also Poisons, page 181.

Cocculus Indicus. A plant used medicinally and shipped as Drugs (q.v., page 113).

Cochineal. A small red-coloured insect from which the well-known dye is procured. About 70,000 of them go to 1 lb. of cochineal. This has generally a sickly odour, and is usually packed in skins or cases, which should be stowed in a dry cool place well away from heat or any moist or raw material. Particular care should be given to its stowage, as it is valuable and readily damaged.

Cocksfoot Seed. See Seeds.

Cocoa. This is the fruit of the Cacao tree, and greatly used as a beverage. It is carried in bags, which should be stowed in a cool place clear of all moisture, well ventilated and not near any article liable to damage it by taint.

Coconuts. The fruit of the coconut palm, which is enclosed in a thick husk of coarse fibre and from which copra and coconut oil are obtained. Often shipped coastwise in bulk, it is carried abroad without the husk, in bags or fibre nets. When in this state and dry they may be stowed under deck without fear of damage.

Coconut Cake. The residue of the mills, when mixed with a little gum-arabic, is coconut cake or Poonac and is used as a food for cattle. Carried in bags and bundles. Stowage as for Oil Cake.

Coconut Oil. A vegetable fat extracted from the dried kernel of the coconut. It solidifies easily at a low temperature, about 70°, and this is the obstacle to shipment by tank steamer. It is used largely in soap-making and in the manufacture of margarine, etc.

Carried in casks, it should be given good cask stowage. As second-hand casks are usually employed, and many often leak, great care should be taken to stow them so as not to damage other cargo. It is also sometimes carried in drums which require careful stowage. See also Vegetable Fats, page 145.

Cocoons. The silky covering of certain insects such as the silk-moth in which they protect themselves during their chrysalis state, and is the source of silks. The boxes or bags containing these articles should be treated as valuable cargo and given special stowage. The bags are very bulky and care should be taken when receiving them to note their measurements as they cannot be pressed. They must be given stowage on top of all other cargo.

Cocus Wood. See Granadilla, page 169.

Codilla. The coarsest part of Flax and Hemp (q.v.) for stowage.

Coffee. The fruit of the coffee tree which is cultivated in hot climates and is largely used as a beverage.

The great bulk of the world's supply comes from Brazil, and is usually shipped in bags in full cargoes. When carried as part of a mixed or general cargo, care must be used to stow it well away from any cargo such as turps, guano, etc., which would easily damage it by taint. It should be well dunnaged, matted and ventilated. A ship dunnaged with bamboos in a similar manner to a rice cargo will give excellent stowage.

Coker. In the Port of London this is often the commercial spelling for Coco to avoid the ambiguous " cocoa " which is used for both coco and cacao.

Coir. The fibre obtained from the husk of the coconut and used in the manufacture of matting, etc., and also for rope and large hawsers on account of its elasticity. Generally packed in bales, but if packed in small bundles or dholls it makes excellent broken stowage.

Coke. This is the residue after coal is baked for the purpose of obtaining gas and other products. It requires plenty of surface ventilation and will absorb a certain amount of moisture, which depends largely on the quality of the coke. It is shipped both in bulk and in bags, and cargo, such as general cargo, should not be loaded in the same hold, as coke frequently taints other goods.

Cola (Kola). A seed used for food and medicine. Stow as Kola Nuts (q.v.).

Colomba (Columba). Variation of Calumba (q.v.)

Colophony. This is Rosin (q.v.).

Concentrates. Partially washed or concentrated ores. Copper, lead, and zinc concentrates are largely shipped in bulk in powdered form, and should be stowed as heavy ores (q.v., page 148).

Condensed Milk. This is usually carried in tins, packed in cases, some of which are very frail. Great care should be exercised in handling, otherwise tins will be dented and become unmarketable, and care must be taken to keep the tins quite dry, or they will rust easily. Sometimes carried in casks, which should be given ordinary cask stowage.

Confectionery. Usually shipped in cases, barrels or airtight tanks, requires no special stowage, but should be treated as foodstuffs.

Congoleum. This is a floor covering of a similar nature to oilcloth, except that it is thinner and harder. It is manufactured in America, and shipped from the United States in rolls, but sometimes small congoleum squares are shipped flat in cases. If in rolls it is on a cardboard cylinder, with a wooden plug at each end, and requires special stowage, as the slightest indentation or breaking of the edges causes irreparable damage. When shipped in rolls it must be stowed on a perfectly flat surface, and dunnage wood must be laid running the same way. Many claims have arisen through these rolls being slightly dented where they have been stowed across boards or battens used for dunnage.

No weight whatever may be stowed on top of Congoleum, nor must it be stacked up high in the vessel's hold. The best stowage for it is right on top of other cargo, as it makes excellent beam fillings laid athwartship in one tier if well blocked off. Hooks must not be used in handling this article.

Copaiba. Balsam of Copaiba (or Capivi) is a deep-brown liquid used medicinally. See Balsams.

Copal. A true resin obtained from Africa, Manila, S. America, etc., and is used in making varnishes. Stowage as for Resins (q.v.)

Copper. A coloured metal shipped in many forms, such as pigs, ingots, bars, thin rods, wire, etc. It requires no special stowage, but preferably if in the form of ingots, bars, etc., stow on the ceiling of a lower hold or a tween deck.

If in the shape of coils of copper rod used for wire drawing these should be stowed on their flats, each coil overlapping two coils on the tier below. This avoids bending the coils and allows a snotter to be passed between them to lift them out of stowage and minimise handling.

Copperas. Called also Green Vitriol, Copperas is a green substance used in medicine, black dyes, and ink making. Usually shipped in casks, but sometimes in bulk, bags and boxes. It should be stowed well away from foodstuffs and in a dry place, as it gives off steam when mixed with water. This article usually rots the containers.

Copper Sulphate. This is Blue Vitriol or Blue Copperas. Stowage as for Copperas (q.v.).

Copra. The dried kernel of the coconut, and is exported from the Philippine Islands, etc. It has a stale oily smell that would damage food products if stowed near them. Shipped in bulk, bales, bags, and cases, it must be loaded in a dry state and in consequence of being very inflammable, precautions must be taken against fire, though this cargo does not appear to be more liable to spontaneous combustion than many others. Copra when carried in bags is sometimes sliced into small pieces. It usually loses 2 to 3 % in weight on a long voyage.

When shipped in bulk copra may be treated as an ordinary bulk cargo, with the exception that great care must be taken as regards ventilation. The carriage of copra is apparently on the decline, as the tendency is nowadays to extract the oil abroad, and this is shipped as coconut oil.

A small insect called the copra bug breeds prolifically in some cargoes of copra, and they have been known to make life almost unbearable for ship's crews. It is advisable upon the first signs of these insects appearing to cover all ventilators, etc. with wire gauze or muslin.

Coquilla. The fruit or nut of a Brazilian palm several inches in length with a very hard shell. Usually shipped in bags, requires stowage as for Nuts (q.v.).

Coral. This is really the fossilised coral "animal." It is a hard substance used for ornaments and articles of jewellery. The rough coral rock is hewn or cut into blocks and used for many purposes, including building in some parts of the East. It is variously packed in boxes, barrels and bags. The manufactured articles should be treated as valuable and given special safe stowage. Rough pieces may be stowed where they will not get broken or damaged, but well away from articles of an edible nature, as coral gives off a very unpleasant odour.

Coriander. A plant the aromatic fruits of which (sometimes incorrectly called Coriander Seeds) yield a spice much used for flavouring. Usually shipped in bags, they require stowage away from goods liable to be damaged by the smell.

Cork. The outer layer of the thick bark of a tree largely grown in Spain and Portugal. It is very light and is usually pressed into slabs and packed in bales, but is also often carried after it has been cut into bottle corks, in large bags; or in various manufactured forms in large cases. Granulated cork or cork dust used for the manufacture of linoleum is carried in bags or pressed into bales. The stowage of cork depends entirely on the method of packing. It often happens that a vessel loading a cargo of copper ore in the South of Spain will fill up all her empty space with cork. Under these circumstances the copper ore should be carefully covered with old separation cloths, or sails, etc., otherwise the small pieces of cork may get mixed with the ore and heavy claims result.

Corn Flour. An article of food made from the ground corn. Shipped sometimes in bags, but usually in cases containing packets. It requires no special stowage but should be kept well away from articles liable to damage it by taint.

Corundum. This is a mineral mainly composed of oxide of aluminium, remarkable for its extreme hardness. Usually packed in about 64 lb. bags, it is valuable and requires stowage in a safe place.

Cotton. See Special Cargoes, page 115.

Cotton Seed. The seed of the cotton plant which after crushing yields a large quantity of oil used for many purposes as edible oil. The residue is then used for cattle feeding and sometimes for making blotting paper, etc. Shipped in bulk or bags it requires no special stowage, but as this commodity sweats very heavily, care should be taken to give it efficient ventilation. It should not be stowed on damp ore or similar substances.

Cowgrass. A wild species of trefoil or clover used for fodder. Packed in bags; no special stowage required.

Cowrie (Cowry). A shell, mostly found in the Seychelles, used in the past as money amongst the natives. It is usually shipped in bulk and in bags, and when clean and free from dirt requires no special stowage.

Cranberries. See Fruit, page 122.

Cream of Tartar. See Tartar.

Creosote. See Dangerous Cargoes, page 189.

Crops. These are the large quarters of the ox, shipped from Australia. "Crops" is also the term given to raw hides, especially those of the cow which, carried in bales, should be given stowage as for dry Hides (q.v.).

Cube Gambier. See Gambier.

Cubebs. Dried unripe fruit of a shrub having a sickly odour and a pungent taste. The oil of cubebs is sometimes used as a medicine for bronchitis, etc. Stowage as for Drugs (q.v.) page 113.

Cudbear. This is a lichen of which large quantities are exported as a dyestuff, a kind of Archil (q.v.).

Cumin (Cummin). A herb shipped from the Mediterranean in bags, and sometimes used as a substitute for pepper. Its fruit (cummin seeds) is sometimes also shipped and used as caraway seeds. The herb requires to be kept quite dry and in a cool, well-ventilated place. See Seeds.

Currants. See Fruit, page 122.

Cutch. This is practically the same thing as Gambier (q.v.).

Cutlery. Such as table knives, razors, scissors, etc., is considered valuable cargo. Usually shipped in tin-lined cases which should be given a safe stowage, well away from such articles as liquids, salt, etc. Stow according to packing.

Cycles. All cycles should be effectively crated before shipment and pedals and handlebars taken off to prevent projection from the crate. The crates should not be stowed between heavy cargo or have any weight stowed on top of them, and should never be stowed on their sides.

Dagga. Indian Hemp (q.v.) for stowage.

Dammar. A good quality resin obtained from several trees. and largely used for making colourless varnish. It is soluble without heat and gives a pale varnish. Stowage as for Resin (q.v.).

Dari. This is a variety of the Indian Millet Seed. Stowage as for Seeds.

Dates. The fruit of the date palm, which is an important article of food. Fine picked dates, generally shipped in cardboard boxes packed in cases, require good cool stowage. Wet dates are usually shipped in cases and require careful handling as they are frail They should be stowed well away from goods liable to damage on long voyages, as the juice often drains from them, and they frequently cause a lot of sweat in the hold. Entire cargoes of dates are shipped from the Persian Gulf.

Cases of dates should not be stowed with their ends landed on beams, stringers, etc., as there is a certain amount of "shrinkage" in a date cargo, and it is often found that cases stowed in this manner are in pieces and will not bear handling on discharge. Wet dates should not be stowed over dry dates. See Fruit, p. 125.

Dextrine. A yellowish-white substance prepared from starch and much used as an adhesive for postage stamps and envelopes, and for many other purposes. Usually shipped in bags, it should be given stowage in a dry cool place.

Dhal (Dal). A common name applied to the split grain of a large variety of pulses. Stow as for bag Grain.

Dhurra. The African name for Dari Seed (q.v.).

Dill Seed. These are used in cooking and medicinally. Stowage as for Seed (q.v.).

Disinfectant Fluids. These consist of many articles variously packed. Some of these are dangerous, and must be stowed according to the nature of the article and the method of packing.

Divi Divi. These are the pods of the small Divi-Divi tree, which contain tannin, and are exported for tanning and dyeing purposes. Usually shipped in bags, they require no special stowage. The extract is also shipped ; see Extracts.

Dodder. A Black Sea seed. Stowage as for Seeds (q.v.).

Dragon's Blood. A deep-red resinous exudation from some species of Sumatra and Borneo rattan palm and largely used as a stain. Usually exported in cases, it should be stowed in a cool, well ventilated place. The best quality is often imported in the form of cylindrical rolls wrapped in palm leaves.

Dross. This is refuse, especially metallurgical. Usually carried in pigs or slabs, it requires no special stowage.

Drugs. See Special Cargoes, page 113.

Duck. A linen or cotton fabric lighter than canvas and used for clothing, light sails, bags, etc. Usually packed in rolls made up in bales Requires stowage as for bale cargo, and must be kept especially dry.

Durra. See Dhurra.

Dyestuffs. This term is applied to all colouring matters used in manufacturing. A great many are of vegetable origin, and perhaps more the product of the chemist.

The colouring medium may be used in the form of wood, or as an extract. In this latter case the juices of the tree are extracted by pressure or otherwise, and the liquid thus obtained evaporated. The dye is thereby obtained as a powder, a much more convenient form for shipment in cases or kegs.

In the case of chemical dyes the manufacturer will supply the fullest details and instructions. Chemical dyes must be considered poisonous and dangerous in so far that they will damage surrounding cargo.

Dyestuffs are often carried in sealed drums, whilst manufactured dyes are generally shipped in bottles or jars packed in cases in small quantities. All dyestuffs must be stowed according to packing away from foodstuffs, or any articles liable to be damaged by leakage. See also Dye, page 190.

Dyewoods. See Timber, page 169.

Earthenware. This comprises such articles as retorts, jars, w.c. pans, wash basins, etc. While sometimes packed in crates they are often stowed loose, well padded with straw. Care should be taken to see earthenware is well blocked off, and that no heavy weight of any kind is stowed on top.

Ebonite. See Vulcanite.

Ebony. See Timber, page 169.

Eggs. Eggs are generally shipped in crates or cases of varying though regular sizes, the eggs being packed in either straw, fibre or husk. The method of stowage depends entirely on the custom of the particular trade dealt with.

Of late years specially constructed vessels are engaged almost solely in the egg trade, being fitted with special compartments in the hold to fit the cases, so that they do not receive pressure. In any event great care must be used in handling eggs, and on no account should they be stowed amongst other cargo, but should be kept by themselves, as they are readily damaged by taint; neither should they be stowed with potatoes or other vegetable produce as these goods are liable to become decomposed and heat, the effect of which will be to damage the eggs if stowed in the same hold. They should be stowed evenly so that the ends of the cases do not in any way overlap, as the strength of an egg case is in its ends and in the partition in the middle.

Of late years a large amount of eggs are being shipped dry in a powdered form in boxes or barrels, which must be stowed according to packing.

Shipments of eggs, packed in large earthenware jars, are made from the East Indian Coast to Burma, each jar containing about 500 to 1000 eggs, usually packed in lime. The outside is protected by a network of grass rope worked from the neck to the bottom, the two ends forming a grommet or strop which is used for hoisting. Great care should be used in handling these as they will easily break to pieces For eggs carried on long voyages see Refrigerated Cargoes, page 154.

Electric Bulbs. These are shipped in slotted cardboard boxes packed in cartons, and require special care when stowing. They should not be allowed amongst heavy cargo but given top stowage entirely alone.

Elemi. A resin used in manufacturing printers inks, varnishes, etc. Stowage as for Resin (q.v.).

Elephant's Teeth. Packed in bundles and cases or loose. Being a valuable article it should be stowed in a safe place, and kept well clear of oil, grease or any acids, as these have an injurious effect on the colour and value of ivory.

Emery. A dark granular stone. Owing to its great hardness it is used for abrasive purposes. It is shipped in bulk, bags, kegs or casks, and does not require any special stowage.

Enamel Black. See Alcohol Compounds, page 190.

Enamel Ware. Usually packed in cases and should be given stowage according to the method of packing, but care must be taken that pressure does not distort the packages, otherwise the contents will be chipped and damaged.

Esparto. A tough and wiry grass, shipped from the Mediterranean, and largely used in the manufacture of paper, rope, etc. It is packed in bales, and usually carried in full cargoes. Due precaution should be taken against fire, as it is liable to spontaneous combustion. On account of its light weight a deck cargo is usually carried, which should be well secured (see Deck Cargoes) page 116, and covered overall with tarpaulins to protect the grass. The deck must be well dunnaged and the tarpaulins laid right down the side of the deck load and tucked in between the lower tier of bales and the dunnage.

Essential Oils. See Oils, page 143.

Euphorbium. A yellowy gum-resin used in veterinary work. Stowage as for Gum (q.v.).

Extracts. These are juices or preparations obtained from a raw commodity. For example the juice of the logwood is an extract of logwood. Carried as both liquids and solids, in various forms of packing, and must be stowed accordingly; but more often as powder in bags which must be carefully handled and stowed to prevent leakage.

Farina. This is a starchy article used for food, for stiffening fabrics, and in making dextrine. It is usually carried in bags, boxes and barrels which should be stowed in a dry cool place away from moist or scented articles.

Fats. See Oils, page 145.

Feathers. Usually packed in bales and bags, they require no special stowage, but should be kept well away from any articles of an oily nature. Valuable feathers such as ostrich, peacock, etc., are usually packed in cases which are sometimes sewn in coverings, and should be stowed as valuable cargo and great care taken against pilferage. Bales of feathers require special attention to prevent them becoming torn and consequent loss of contents.

Felspar. A group of minerals that are constituents of nearly all crystalline rocks; such as granite, mica, slate, etc. Carried in bulk and bags, requires stowage as for Minerals (q.v., page 148).

Felt. This is a cloth made of wool, hair, etc., moistened, heated, rolled, and pressed, but unwoven. It is shipped in many varieties, such as fine felt used for making hats, etc., which is shipped in bales, or the rougher qualities such as roofing felt are shipped in large rolls which should be given handy stowage near a square hatch and special fire precautions taken. See also Dangerous Cargoes, page 190.

Fennel Seed (Fenugreek). See Seeds.

Fertilisers. There are a large number of these substances carried, and they are mentioned under their particular names.

Fibre. A thread-like substance obtained from various sources and used for making many articles, such as brushware, mats, etc., and in ropemaking. May generally be used as broken stowage if in small bales, otherwise no special stowage is required.

Figs. See Fruit, page 125.

Films. These are made of celluloid and are usually packed in tins in cases. They should be given lock-up stowage and be accessible for a quick delivery. Special regulations regarding the importation of foreign films exist, consequently they should always be available. See also Dangerous Cargoes, page 192.

Firearms. Such articles as rifles, revolvers, etc., usually shipped in cases, require no special stowage, but must be kept quite dry and away from any damp articles.

Fish. Fish is carried in various forms ; in bulk, alive or dead, salted, or preserved in tins.

The carriage of live or fresh fish is a trade on its own, and is governed by the methods and usage of each particular district. In some cases it is carried in boxes packed in ice, and in others in specially constructed vessels, where it is carried alive in tanks. The carriage of salt and dried fish, such as that shipped from Newfoundland, at one time was a very important and profitable trade. Small sailing vessels were regularly employed in carrying this fish to Spanish and Mediterranean ports. It was mostly carried in barrels, but nowadays this trade is apparently dying out, and it is shipped aboard steamers amongst general cargo, usually in small parcels.

Preserved or tinned fish is packed in many different forms such as tinned herrings, pilchards, sardines, etc., which require no special stowage, but should be stowed as ordinary general cargo. There is still a small trade during the season carrying salted herrings from the North of Scotland to European and Continental ports. These are packed in wet kegs and casks and are stowed accordingly.

Fish Manure. A valuable fertiliser, much used in the growing of beet. It is usually packed in mats and bags, and has a disagreeable odour, and breeds maggots, etc. Should be stowed by itself, well away from articles of an edible nature.

Fish Oil. See Oils, page 145.

Flavine. A yellow colouring matter. Stowage as for Dyes (q.v.).

Flax. In Eastern countries flax is chiefly grown for the oil obtained from its seed, but in colder climates the fibre is principally used. It is shipped in bales and requires no special stowage, but should be dunnaged between wool, copra, or articles of an oily nature ; in any case dunnage and mat this cargo well and take precautions against fire. Care should be taken not to ship this in a damp condition, or it is liable to spontaneous combustion.

Flint Pebbles. May be carried as ballast, but are not recommended for this purpose unless under a light cargo, as they are liable to shift if stowed alone. Require no special stowage.

Flour. This is the name applied especially to the contents of the Wheat Berry. Flour is carried in barrels and bags, which should be stowed amongst dry goods, as it is easily damaged by taint. It should on no account be stowed near tar, turps, or goods of an oily or damp nature. Apples and flour are often of necessity carried in the same vessel, but great care should be taken not to stow them in the same hold, as much flour has been damaged by apple taint. When carried in bags they must be well dunnaged and matted.

When carried in casks 8 heights is sufficient, after which no weight should be stowed on top of them. They should be given good cask stowage, as should a lower tier cask collapse the whole lot will get adrift and in heavy weather cause considerable damage.

Flowers. These are shipped both as artificial and dried, when they require no special stowage. Live flowers should be stowed as required by the nature of the plant.

Fluorspar. This is a common mineral and shipped in bulk. Stowage as for Minerals (q.v.) page 148.

Flux, Heavy (Fluxphalt). See Asphalt.

Footwear. Boots and shoes are usually carried in cases and require no special stowage, but care must be taken to guard against pilferage. Owing to the great amount of pilferage that has taken place in the last few years, usually lefts and rights are placed in separate packages.

Formaldehyde. An antiseptic and disinfectant carried in drums and barrels. More commonly known as Formalin, a 40 % aqueous solution used in the manufacture of dyestuffs. The solution has a pungent odour and should be carried on deck. See also Formic Acid, page 108.

Freestone. Any kind of stone, but especially lime and sand stone, that can be cut without splitting it. See Stones.

Frozen Meat. See Refrigerated Cargo, page 153.

Fruit. See Special Cargo, page 122.

Fuel, Oil. See Oil, page 134.

Fuel, Patent. See Briquettes.

Fuller's Earth. This is carried in bags and barrels, and the more refined quality in small boxes or tins in cases. Must be kept dry but requires no special stowage. When carried in its rough state in bags, and stowed above other cargo such as timber, etc., an old separation cloth or tarpaulin should be placed beneath it, as the bags are often very poor, and if this commodity gets into timber heavy claims result, as the fuller's earth does damage to the machinery when dressing the wood.

Furniture. Sometimes shipped loose, in which condition it requires very special attention. Usually packed in cases, however, which vary very much in size and shape, but must be given good dry stowage, and special care taken to stow them where no weight will come on them.

Furniture Vans. These must be stowed on a level bed to prevent distortion and consequent damage to the contents.

No weight must be stowed on them, but if it is necessary to stow them low down in the hold the top must be protected by laying strong planks over the vans from the cargo on either side to take the weight.

The proper slinging of these vans should be seen to, as if slung by a strop round the centre the vans are liable to be severely damaged. If not fitted with the iron sling bands, it will be necessary to hoist them with rope or wire strops. These should be placed about halfway between the centre and the end of the case, and both bights joined to the hook for hoisting. This will lift the van evenly and avoid excessive strain on any one part.

When receiving these vans great care should be taken to note their condition, and also the number of keys and locks, etc. attached to them.

Furs. Usually packed in boxes and bales these should be treated as valuable goods, and stowed in a dry safe place. In any case the skins must be well protected from chafage or damage by contact with iron, etc. Fur garments are often shipped in tin-lined cases. Sometimes the cases are sewn in canvas and sealed, in which case they should be given " lock up " stowage if possible.

Fustic. See Timber, page 169.

Galangal. A fragrant root, somewhat like ginger, and generally free from objectionable qualities. It is usually carried in bags and requires good dry stowage.

Galbanum. A gum-resin used to a small extent in medicine and in varnish. It is yellow in colour and has a bitter taste. Usually carried in bags, they should be given good cool stowage.

Gall Nuts. These vary in form and composition, according to the insects producing them, and the plants on which they are formed. They possess gallic and tannic acid and are largely used in manufacturing and as a medicine. They are usually carried in bags. If shipped dry and clean may be stowed amongst other goods. In large quantities they are liable to heat, so require plenty of ventilation.

Galvanised Iron. This is iron coated with zinc. It is usually in sheets which are often corrugated, and are carried in various packings, but generally in crates and cases.

These cases are very heavy, sometimes weighing 5 to 10 cwt. each, and should be well stowed. The method of stowing naturally depends on the available space or position in the vessel, but the cases must always be stowed on a flat surface to avoid distortion.

It is sometimes the practice to stow them on their edges in the lower holds, especially where it is necessary to load much cargo above them ; in such a case they should be floored over with deals. We prefer, however, if convenient stowage is available, that they should be stowed in the tween deck on a good flat surface with only light cargo above them.

When laid on their flats, particular care should be taken that the corners or edges of the cases are not " hung up " on beams, stringers, tunnels, etc., otherwise they will be seriously damaged. Care should be taken that these goods are not worked in rainy weather, and also that they are handled carefully, as the packings are usually frail, and the contents, being heavy, considerable damage may easily be caused by the plates being bent or buckled, especially at the corners. It is desirable to ensure that the zinc coating is perfect, for if the coating be damaged the iron will rust, particularly if it be exposed to moisture and varying temperatures. See Tinplates.

Gambier. An extract prepared from the leaves of Eastern trees and much used for tanning purposes. It is very soluble and therefore should be stowed by itself if possible, as otherwise it will stick to the skin of the ship or damage surrounding cargo by stain. The usual manner of stowing mats of gambier is to put a small leaf mat vertically between each package to prevent them running together, and spread saw-dust between each tier. In spite of all such precautions it is usually found to be one solid mass at the port of destination and is most difficult and costly to discharge.

Before stowing any other cargo near it, it must be protected by good dunnage and matting.

With this cargo not only will the bags stick together, but the moisture will drain into the limbers and choke the roses if not protected. It gives off a somewhat stale smell, and this will have to be guarded against, as on long passages it may damage other cargo. It is often shipped in bags and mats, but usually nowadays as " Cutch " in cases.

Before stowing other cargo therein, any space that has been used for the carriage of Gambier should be thoroughly cleansed.

Gamboge. A gum-resin from which the drug of this name is made. It is also used in water-colour painting owing to its brilliant colour. It is usually shipped in cases containing the gum in the form of small cylindrical sticks called " Pipe Gamboge," formed by the liquid being collected in lengths of bamboo-cane, and also in lumps in cases. Requires no special stowage.

Gambree. A variation of Gambier (q.v.)

Ganister. A dark close-grained stone used for brick making. No special stowage required.

Ganja. A preparation from the hemp plant used in the East as a narcotic and as tobacco. It is shipped in small quantities in bundles. Stowage as for drugs (q.v., page 113).

Garancine. A dyestuff made by treating madder with sulphuric acid. See Dyestuffs.

Garlic. See Onions.

Gentian. The roots of the yellow flowered Gentian herb. Usually packed in bales, it requires no special stowage.

Ghee (Ghi). An oily kind of butter, made and used as a foodstuff in the East, by the Mohammedans in place of lard which, coming from the pig, they are debarred from using. This is a difficult stuff to find suitable stowage for but a good cool place by itself should be found if possible It is usually packed in second-hand casks or kerosine oil tins, and frequently leaks during the voyage, especially when subjected to any heat. It should not be stowed near the boilers or any article of a scented nature, otherwise the ghi will be damaged.

Gin. See Alcoholic Liquors, page 112.

Ginger. The root of a plant. The young rootstocks when preserved in syrup become the Preserved Ginger of commerce. Much used also as a spice. This is generally shipped in small cases containing six or more jars, and special care must be used to stow these marks uppermost or the syrup will leak out and damage other goods.

Dry ginger roots are shipped in double and single bags and bales, whilst moist or green ginger is usually shipped in baskets.

Gingelly. This is Sesame Seed (q.v.).

Ginseng. The root of a plant grown in North Asia and valued by the Chinese as a medicine. It is packed in shallow oblong baskets and should be given good dry stowage as choice cargo.

Glass (Sheet or Plate). Glass of all sizes from small cases to plate glass requires very careful handling ; it must always be worked and stowed on edge. Good flat stowage should be found, and all cases stowed athwartship, with the properly marked side uppermost. When stowing glass in a tween deck, the cases should be stowed athwart on the flat deck with no dunnage. Large plate glass is packed in bolted cases, and these should be stowed in the most convenient place for a safe carriage. If stowed under the deck it may be extremely difficult to get out without bending the cases. It is usually best to land the plate glass on a flat bed, lash it to prevent it falling, and build around it with suitable small cargo, and in discharging ease it out to the square of the hatch with this lashing. Silver plated glass is packed with flannel between each sheet and is often placed in tin-lined cases. Avoid working glass at night.

Glass Ware. Glassware is carried mostly in dry casks packed in straw or wood shavings, etc. Great care must be taken in handling these goods. The best possible stowage that can be given to casks of glassware is to stow them on end in a tween deck, or level surface of other cargo, with a board or boards on top of the casks between the tiers with no heavy cargo stowed on top. These should not be stowed more than two tiers high.

Glaxo. A patent food preparation from milk, shipped from New Zealand in large and small tins in cases of 56 to 72 lb. each. They require no special stowage, but must be kept in a dry cool place. Block stowage is best, though the cases may be utilised as beam fillings.

Glucose. This is sugar found in many fruits, especially grapes, and also in honey, and is used in the preparation of alcohol and for many other purposes. It is usually packed in barrels and kegs and sometimes in cases. Grape glucose is also packed in bags. Must be stowed according to method of pack.

Glue. Glue is impure gelatine, much valued for its adhesive properties. If carried as a liquid it must be given special stowage in a cool place. Glue pieces are usually packed in bales. These must be given good stowage in a well ventilated place away from any heat. Several cases of fire attributed to spontaneous combustion have occurred with glue pieces. Glue requires to be kept dry to prevent putrefaction, when it would taint adjacent cargo.

Glycerine. A thick colourless liquid having a sweet taste, extracted from a fatty substance during the process of soap making, and used in many ways. It is sometimes packed in tins in cases, but usually in iron drums, which should be stowed as moist cargo and not amongst dry goods.

Goat Skins. See Skins.

Gold. See Precious Cargo, page 150

Goora Nut. See Kola Nut.

Goudron. See Tar Oils, page 142.

Grain. See Special Cargoes, page 128.

Gram. The most important Indian pulse used as a food for cattle, etc., shipped in bags. Stowage as for Seeds (q.v.).

Granadilla. See Timber, page 169.

Granilla. This is cochineal refuse. Stowage as for Dyes (q.v.).

Granite. A grey-coloured rock carried in loose blocks, or as broken granite for road material, which is shipped in bulk. Finished granite is sometimes carried in cases. Requires no special stowage.

Grapes. See Fruit, page 124.

Graphite. See Blacklead.

Grass Seed. See Seeds.

Grease. See Oils, page 134.

Grindstones. These are sometimes packed in cases, but are usually carried loose, when they must be stowed on their edges and well blocked off. They require careful handling to prevent breakage and/or chipping.

Ground Nuts (Pea, Monkey, or Earth Nuts.) These nuts are much used as a food and for the oil obtained from them, and largely employed in the manufacture of margarine and kindred foodstuffs. They are sometimes carried in bags, and when shelled and dry may be stowed amongst dry cargo.

Full or part cargoes of Ground Nuts are often carried in bulk, especially from the West Coast of Africa. It should have ample surface ventilation, as the nuts easily become heated when new, especially if loaded in, say, May or June at West African ports after heavy rain. Nuts if lying out in the open will be very wet, and when loading, great care must be taken to see that no wet nuts are stowed near the boilers or bunkers, as this has been the cause of many fires in the past.

When loading shelled nuts on the Indian coast, a temporary platform should be used to land the slings of cargo on, to prevent the bruising of the cargo in the hatchway, as serious damage has been caused frequently by the bruised nuts heating and bags being scorched.

Guano. The accumulated excretum of birds found in some Pacific Islands and the coasts of Chile and Peru. It contains phosphorus and ammonia, and is largely used in the manufacture of patent manures. If carried with other goods, great care should be taken to avoid damage to them. All foodstuffs must be kept in another hold, or the smell will injure them, and it will turn nuts and feathers, etc., black. In its turn it will be injured by contact with salt, nitrate of soda, etc. Guano is often carried in full cargoes, and is one of the few cargoes left for sailing vessels. It needs no special stowage, but must be kept dry. Vessels loaded with a full cargo of guano are usually battened down and ventilators closed after loading, and kept in this condition during the whole voyage.

Guinea Maize (or Guinea Corn). See Sorghum Seed.

Gum. Gum is an exudation of trees and plants, and is usually soluble in water. There are many kinds of true gums, the most important being Gum Arabic, Ghatti, Persian, Tragacanth, and Wattle, nearly all of which are used as adhesive and thickening mediums. Gum Arabic is the most important, and is largely exported from the Nile and Senegal, whilst Ghatti comes principally from India. Tragacanth is mainly exported from Smyrna in the form of dry flakes.

Gums are carried both in cases and bags and, especially in the latter packing, should be stowed in a cool place. They should be stowed well away from oily goods or anything liable to damage them by taint.

Gum Resin. Gum-resins are really plant exudations consisting of a mixture of gums that are soluble in water, a large amount of true resin, and a little essential oil. The most important are Asafœtida, Galbanum, and Gamboge, which are all given under their respective headings.

Gunjah. A variation of Ganja (q.v.).

Gunnies. These are bags of standard sizes made from jute. They are exported largely from India and shipped to all parts of the world in bales, which usually contain about 250 bags and are pressed by machinery. Gunnies have no objectionable qualities, and may be stowed as desired, but care should be taken if stowed with other cargo liable to sweat that they are not placed under beams, etc., where moisture would drop on the bales. The word "gunny" includes all kinds of jute manufactures such as hessian and rough sacking.

Guttae, Gum. See Gamboge.

Gutta. The principal constituent of Gutta Percha (q.v.).

Gutta Percha. A gum resembling Caoutchouc. Carried variously in bags, baskets, and cases, it requires no special stowage. For Gutta Percha Solution, see page 192.

Gypsum. A mineral used in the preparation of cement and other articles. The variety found near Paris produces Plaster of

Paris. Usually carried in blocks, bags, or barrels, this article requires good dry stowage. When dry it will absorb ammonia from chloride of lime, manures, etc.

Hæmatoxylin (**Hæmatin**). Crystals obtained from Logwood and used in dyework. Carried in barrels and cases, requires no special stowage.

Hair. This is packed in pressed and unpressed bales and requires no special stowage. The unpressed bales, however, are usually badly covered and easily torn, and care must be used in handling them, as often great loss of contents occurs.

Hams. Salted and smoked, are packed usually in barrels, but sometimes in cases, or loose. For stowage, see Bacon.

Hartal. The mineral Orpiment or Sulphide of Arsenic (q.v.).

Hay. Dry fodder obtained from grass or other herbs, and is an important foodstuff for animals. Hay is now mostly carried in compressed bales, and must be quite dry when shipped, as it is liable to spontaneous combustion.

It is advisable to give the bales upper stowage near the hatch square, if any doubt exists as to their being quite dry.

Hellebore. Powdered roots used in medicine and as an insecticide. See Drugs, page 113.

Hæmatin. See Hæmatoxylin.

Hemp. The name applies to textile fibres used for manufacturing purposes. Mostly employed for cloth and rope making, but a small quantity is used in pharmacy. Hemp is packed in bales, and when not carried in full cargoes should be loaded in a dry condition, and given upper stowage if possible, well dunnaged and matted.

Manila Hemp bales are bound with rattan canes, New Zealand with fibre rope, whilst Sisal bales are bound with wire.

Care must be taken to see that hemp does not come in contact with grease or oil, or any substance of such a nature, as it is liable to spontaneous combustion.

If stowed with wool, dunnage must be placed between the hemp and wool.

Hemp Seed. See Seeds.

Henbane. The leaves of the poisonous Henbane herb much used in medicine. See Drugs, page 113.

Henequen. This is Sisal (q.v.).

Herbs. A term which includes all grasses and plants used for culinary purposes. A great many are further used for medicinal preparations. These are generally packed in bales and bags, and must be kept perfectly dry and stowed according to package.

Herol. This is a Gum (q.v.), for stowage.

Herrings. These are usually salted and packed in barrels and kegs. They should be stowed as wet cargo well away from all articles of a dry nature. In small vessels with full cargoes they should be given good cask stowage and well blocked off.

Hessian. The finest quality of jute yarn. See Burlap.

Hexamine. A Drug (q.v. page 113).

Hickory. See Timber, page 169

Hides. These are the undressed skins of cattle, horses and other large animals which when tanned and dressed become leather. They are variously carried either in a dry condition or wet or dry salted.

Dry hides are those that have been sun dried after having been treated with a special mixture. They are usually carried loose in bales, which should be given good stowage and never loaded amongst wet hides or moist goods.

Dry salted hides are those that have the salt rubbed into them before the treatment, and they are then packed in barrels, bags, or loose.

Raw hides from South America are sometimes salted into a vessel. The iron of bulkheads, stringers, etc., is first covered with wood and the raw hides laid flat with the hair underneath, and salt then sprinkled over them—then another layer of hides, and so on till the compartment is full.

Salted hides are often carried folded into square bundles and are stowed loose in a wet condition, and in this case should be stowed by themselves in a wet deck or in some place in the bottom of the vessel. Care must be taken that they will not damage other cargo, as a large quantity of brine will drain from them, and in cases where they have been piled at one end of a hold as much as six inches of brine has been found on the ceiling in the other parts of the hold.

In every case when carried loose or in bags, hides should be kept as flat as possible, and most carefully dunnaged and matted. All stanchions or any other iron, even hoop of casks, if not carefully covered, will seriously damage the hides. They may rot and become useless, and in any case if at all marked will result in heavy claims. This iron damage is very difficult to observe, and is sometimes imperceptible until the process of tanning is nearly completed. Chafing should also be avoided. For stowage of sheep hides, see Pelts.

Hides (Green). Owing to the objectionable pungent odour, these must not be carried in emigrant ships, and in other vessels they should be stowed away from foodstuffs and living quarters.

Hominy (Hommony). Inner part of a West Indian maize berry, and used as a foodstuff. Carried in bags and cases, requires no special stowage.

Honey. Substance produced by bees, and much used as a foodstuff and for medicinal purposes. It is shipped in casks from the West Indies and other parts ; but sometimes in tins or jars in cases. Should be given good stowage according to the method of packing.

Hops. A plant of which the cone-shaped spikes of the flowers known as "hops" are extensively used by brewers. They are usually packed in both pressed and unpressed bales, or in "pockets," and should be stowed in a cool place away from moisture.

Horns. These are generally shipped loose for broken stowage, but are carried sometimes in bags, and require no special stowage.

Horn Tips. The solid ends of horns used for making pipe mouthpieces, etc. Shipped in bags, they must be kept very dry, as, should they get wet, they will crack and split when drying and be rendered useless.

Horses. See Live Stock, page 134.

Hypo. Sodium hyposulphite, the "hypo" of photography. Generally carried in bags or tins, it must be kept dry. Stow according to packing.

Illipé. The fruit of an East Indian tree called Illipé Nuts are shipped largely in bags for the extraction of the oil. Require no special stowage, but must be well ventilated.

Immortelles. These are artificial "everlasting" flowers, and should be given good careful stowage, with no weight stowed above them, preferably in a special place, such as a spare cabin.

India Rubber. A highly elastic form of Caoutchouc from India. See Rubber.

Indigo. A blue pigment prepared from a plant grown in the East. It is packed in well-lined hardwood cases, sewn in gunny, and shipped in this condition. If possible indigo should be stowed in an upper deck by itself, with plenty of dunnage, otherwise it requires no special stowage, except that it should be well separated from other cargo, or damage may be caused by the blue dust from the indigo.

Iron and Steel. For stowage purposes these two articles may be taken together. They are shipped in many forms, such as pig, bar, billet, bloom, rod, plate, sheet, hoop, etc., etc., each of which requires different stowage.

Pig iron should be stowed solid if in small quantities, but large quantities are usually stowed loose in a hold and the weight kept as high as possible. If in a vessel with a tween deck, a proportion of the cargo sufficient to prevent the vessel being too "stiff" should be stowed in the tween deck and well secured.

Bar iron should be stowed quite flat, and care taken in loading and discharging to prevent the ends getting bent.

Plate and sheet iron must be stowed flat and, like hoop iron, must be kept perfectly dry. Steel hoops are usually in bundles, and are liable to damage by bending if overstowed with heavy cargo.

Steel billets should be kept clean and well clear of oil, as cases have occurred where they have been ruined for making tinplates by contact with oil.

Steel tubes may be of any length, either loose or in bundles. They are often coated with tar, the more valuable such as Mannesmann tubes being bound round with a tarred material and chalk covered to protect them. All tubes should be stowed fore and aft, and well blocked off.

Great care must be taken to keep steel dry, as the slightest rust will often ruin steel articles, especially such as coils of thin iron bands.

Different lots of iron and steel should be separated, and a strand of rope will well serve the purpose, but care must be taken to see that it is dry. Before overstowing iron or steel with any other cargo, good dry flat dunnage should be used.

For the stowage of steel rails, see **Railway Iron.**

Iron Ore. See Ores, page 148.

Isinglass. A pure form of gelatine obtained by drying the swimming bladder of the sturgeon and other fish. Much used in making jellies and in cooking, it is usually packed in cases, and sometimes in bales. Requires no special stowage, but must be kept in a cool place.

Ivory. The tusks of elephants. These should be carefully handled, remembering that each tusk is very valuable. They should not be used as broken stowage.

Ivory should be stowed well away from grease, oil, acid, etc., as these will damage it. When tallying out the tusks, care should be taken to see that one tusk is not nested inside another.

Scrap ivory is sometimes carried in bags and casks.

Ivory Nuts. The seeds of a South American palm and are the size of a hen's egg. The inside substance is used as " vegetable ivory." Stowage as for Nuts (q.v.).

Ixtle (Istle or Ystle). A very valuable fibre used for cordage, nets, carpets, etc., obtained from various tropical American plants. No special stowage is required. The variety shipped from Tampico is called Tampico fibre.

Jaggery. A very dirty damp sugar obtained from the sap of various palm trees. When new from the factory it is hard, but after exposure to heat it becomes soft and treacle runs from it ; in fact the whole mass seems to run together, and a dark coloured syrup oozes out. Great care should be taken not to stow the bags or mats over any other articles, and if overstowing on jaggery, good dunnage and mats must be used.

Dry sugar should never be put near jaggery without being well separated.

This cargo is said to lose 10 % in weight during the voyage and is liable also to heat and cause spontaneous combustion.

Of late years it is seldom carried in its natural state.

Jalap. A Mexican root which when powdered yields a medicinal balsam. See Balsam.

Jamaica Pepper. See Allspice.

Jambul (Jambool). A small Javanese tree whose bark and seed are used medicinally. Stowage as for Seeds.

Jams. See Canned Goods

Jarrah. See Timber, page 170.

Java Cotton. See Kapok.

Jelotong. An inferior gutta-percha obtained by tapping the Jelotong tree and used principally in manufacturing chewing gum. Each case contains 2 or more balls which have been rolled or made up in water, and consequently the moisture frequently oozes from the packages, so should be given wet stowage, and near no dry articles.

It is seldom now shipped, except on the Coast of Malaya.

Jerked Beef. The name used for beef that has been cut up into strips and dried in the sun. Shipped mostly from the Argentine to Mediterranean Ports. It must be stowed in good dry stowage, clear of oils and other cargo which would contaminate it.

Jowar (**Joaree**). The Indian name for Dari Seed (q.v.).

Juniper. The berries of the Juniper tree which give medicinal oil (see Essential Oil, page 144). Usually shipped in bags, they have an odour similar to turpentine, and in consequence must not be stowed near articles of an edible nature, or any goods liable to be damaged by taint.

Jute. See Special Cargoes, page 133.

Kainite. A mineral sometimes shipped in powder form in bags, but mostly in the rough in bulk. It is much used as a fertiliser and requires no special stowage, except that it must be kept perfectly dry, as if water reaches it Kainite forms a hard solid mass and would require to be picked out of a vessel.

Kaolin. Another name for China Clay (q.v.).

Kapok. A silky wool-like cotton, much used for stuffing life belts, etc. Usually carried in bales, it requires no special stowage. Often called Java Cotton.

Kardi. See Safflower.

Karross. A native African garment made from skins that are sewn together. Shipped as curios and require no special stowage.

Kauri. Kauri is a kind of Copal, a true resin found principally in New Zealand. It is valuable, and is shipped in bags and cases which should be kept dry, but otherwise requires no special stowage.

See also Timber, page 170.

Kayu Putch. See Cajuput.

Kernels. The usual term applied to shelled Ground Nuts (q.v.).

Kieselguhr. This is a grey earth found as a deposit in fresh-water lakes, and is used in preparing dynamite, soap, etc., and for packing around certain acids. Requires no special stowage.

Kittul (**Kittool**) **Fibre.** The coarse fibre yielded by the jaggery palm. See Fibre.

Kola (**Cola**) **Nut.** Another name for Goora Nut. The seed of a tropical African tree, and said to contain excellent properties, one of which is to make half-putrid water drinkable.

The nuts are about the size of a chestnut, and are shipped in bags which may be stowed anywhere, as they have no objectionable qualities. If shipped in large quantities they should be well ventilated, otherwise on long passages the nuts will heat.

Lac. A resinous substance from the Banyan tree, found principally in India, and in its natural state is termed Stick Lac. After boiling in water it loses its colour and is called Seed Lac. This is shipped in cases and bags, and the colouring matter which is precipitated during this treatment is dried, pressed into cakes, and termed Lac Dye, but this is not much used now commercially. When the first mixture is melted it is called Shellac, and forms the basis of sealing wax, varnishes, lacquers, etc. This is usually packed in cases lined with mats or in bags, and can be stowed in any dry cool place.

When stowing cases, if possible keep them on edge, as this, especially in hot weather, will prevent the sheets of lac adhering to one another and becoming one solid block.

Lace. A delicate fabric of two kinds, hand and machine made, and sometimes of considerable value. The better qualities are usually packed in tin-lined cases, and the poorer qualities often in bales, which require good bale stowage.

Lamb. See Refrigerated Cargo, page 153.

Lampblack. An almost pure form of carbon, and is a soot produced by burning in furnaces the coarser parts of tar, etc. It is much used in the manufacture of inks. Shipped usually packed in cardboard cartons or paper packets, which are in paper-lined cases. These cases are often very lightly constructed, and must be handled carefully and not worked over, as they are easily broken and may suffer loss of contents besides damaging other cargo stowed in the same hold. If newly made, lampblack is said to be liable to spontaneous combustion, and in some ports is classed as hazardous goods.

Lapis Lazuli. A blue coloured stone largely used for decorative purposes. It is shipped in cases which should be carefully handled and stowed flat in order to prevent them becoming distorted and the contents receiving damage.

Lard. Fat obtained by melting pork, and much used in cooking. It is variously shipped in barrels, pails, etc., but mostly in wooden boxes, containing two blocks of lard weighing 28 lb. each, wrapped in grease-proof paper. Cases require very careful handling, as it will be found that the nails draw easily, and if roughly handled they are easily burst open.

Lard should be stowed in a cool place, and when shipped with a general cargo in a vessel without insulated chambers should if possible be stowed below the waterline ; at the same time, as near the tween deck hatch coaming as possible, as quick delivery is imperative in the summer months.

In warm weather boxes of lard should on no account be stowed immediately under an exposed steel deck, as the heat from the deck will seriously damage the top tiers of cases.

Latex. A fluid found in seed plants which contains much gum-resin, wax, etc., The chief commercial form is Caoutchouc (q.v.).

Lead. This is shipped in various forms, as pig, sheet, piping, etc.

Pigs of lead when carried in large quantities should be stowed solid and well secured. Amongst general cargo, the pigs should be stowed right across the vessel on the ceiling if possible.

Sheet lead should be stowed on its flat, and when in rolls great care is necessary not to damage it by stowing heavy cargo above it or using uneven dunnage, etc., which might indent the rolls.

Stowing lead piping requires care, for if not properly handled it gets bent and dented, etc. When loading amongst general cargo it should be coiled in a space by itself and no weight placed on top. Smaller lead piping is usually nested in casks and the larger frequently carried in cases.

Leather. This is obtained from hides or skins of animals by tanning, and is used for a great number of purposes. Leather is variously shipped in bundles with hessian covers, bales, trusses, casks or cases.

The packages should be stowed away from oil, grease, tar, acids, etc., and should be well protected against contact with iron, and secured against chafage.

Leaves. Such as Bucha, Senna, Sumac, etc., are carried in compressed and uncompressed bales, and bags, which require no special stowage.

Lemons. See Fruit, page 123.

Lentils. The seed of a Mediterranean herb, and is a valuable article of food. Shipped in bags which require no special stowage, but must be treated as a foodstuff.

Lift Vans. See Furniture Vans.

Lignum Vitae. See Timber, page 170.

Lime. This is the name given to Oxide of Calcium, also called Quicklime. If water is added it is called slaked lime. It is a white powdery substance and much used in the preparation of cements, mortars, etc. In the East it is often called Chunam. It is generally shipped in casks and bags and must be kept perfectly dry. If unslaked and water reaches it, it may cause adjacent articles to catch fire.

Lime, Acetate of. A salt of acetic acid that is obtained from the acid liquor produced by the distillation of wood. Shipped in barrels and bags, no special stowage is required.

Lime, Borate of. A salt lime obtained from Boracic acid. Stowage as Lime (q.v.).

Lime, Chloride of. See Bleaching Powder.

Limes. See Fruit, page 125.

Lime Juice. The liquid from the Lime fruit, usually packed in bottles in cases which should be carefully handled and stowed as ordinary bottled goods.

Linoleum. A floor covering made from cork dust and carried in rolls. These should be stowed flat with no wood or other dunnage laid across them, and great care should be taken not to dent the rolls. The stowage mentioned under Congoleum practically applies to Linoleum.

Linseed. The seed of the Flax plant which gives Linseed oil (q.v., page 143). It is largely carried both in bags and in bulk, usually the former. When in bags it must be well dunnaged, matted, and ventilated. If in bulk, as it is smooth and runs easily, it must be stowed like grain, with shifting boards which should be close fitting, for which stowage see Grain, page 128.

Liqueurs. See Alcoholic Liquors, page 112.

Liquorice. A peeled root much used as a medicine and a flavouring article. Usually shipped in cases and bales, they require no special stowage.

Locomotives. See Heavy Lifts, page 132.

Locust Beans. The pod of the Carob tree, and used as food for cattle. Stowage as Carobs (q.v.).

Logwood. See Timber, page 170.

Lucerne Seed. A pasture and forage plant. Stow as for Seeds (q.v.). In the U.S.A. it is called Alfalfa.

Lumber. See Timber, page 164.

Macaroni. See Vermicelli.

Macassar Oil (**Makassar**). See Oils, page 134.

Mace. A spice shipped from the Straits Settlements and the West Indies, usually in bags and cases. It should be stowed as dry choice cargo, well away from any articles of an oily nature.

Machinery. Owing to the various kinds of packing, variation in dimensions and weight, etc., it is impossible to lay down any clear or defined rules for the stowage of machinery.

If possible stowage on the " skin " of the lower hold should be kept for the heavy cases, and these may be built around with other cargo. The lighter cases should be given upper stowage but well secured. All cases of machinery should be handled very carefully, as they often contain very light cast iron parts which even with the sharp turning over of a case will be sometimes broken and the machinery seriously damaged.

Madder. The root of the Madder plant which gives a bright red colouring matter much used as a dye. Usually shipped in bales, casks and cases, it must be given good dry stowage, as it absorbs moisture and ground Madder deteriorates in value if it becomes damp.

Mafureira. See Sunflower Seed.

Magnesia. A white powder used in the manufacture of crucibles, etc., and in medicine. Usually shipped only in small quantities in chests or in bottles in cases. It should be stowed in a dry place, as salt water or damp air is liable to damage it.

Magnesite. An ore—the source of carbon dioxide. It is shipped both in the crude state and as the calcined lump in bags. Stowage as for Ores and Minerals (q.v., page 148).

Magnesium Metal. This is a white metallic element which will burn with a brilliant white light. It must be packed in tin-lined cases, when it is quite harmless and requires no special stowage.

Maize. See Grain, page 128.

Malangas. The roots of a West Indian plant, and an important vegetable in Cuba. Sometimes shipped in barrels—stowage as Potatoes (q.v.).

Mallet Bark. See Bark.

Malt. Grain (usually barley) is steeped in water and then spread out, when it heats and grows. Germination is stopped first by reducing temperature and then by excessive heat. The mass is then gradually cooked in a kiln and rendered dry and crisp. This is Malt—and it is shipped in bags which require good bag grain stowage (see page 16). It is also frequently shipped on long voyages in iron tanks, which require no special stowage. Great care must be used to see that no wet or moisture reaches this article in stowage, as being kiln-dried it will naturally absorb moisture very quickly, and if at all moist it is not suitable for brewing.

Manchester Goods. See Bale Goods.

Mandioca. A variation of Manioc (q.v.).

Manganese Ore. See Ores, page 148.

Manioc. A flour from the Cassava plant from which a kind of bread is made, used by natives of India and Africa. It is exported in lump form from Brazil See Tapioca.

Manjeet. A variation of Munjeet (q.v.).

Manure. This comprises various substances which are added to soil as fertilisers. Whenever possible this article should be stowed in a hold by itself. The vapour from superphosphates will attack articles of an edible nature, rendering them unfit for use. Before receiving any shipment of this nature, full information should be obtained as to its liability to damage other goods. Fish and other manures have a most offensive odour, and should not be stowed amongst other cargo. Manufactured chemical manures may sometimes be carried below, provided they have no objectionable qualities beyond a liability to heat when in the hold, which can be ascertained beforehand.

Marble. A crystalline limestone much used for decorative and building purposes. It is usually stowed loose or in slabs, sometimes in crates, and worked marble in cases. When loose it should be laid flat on the ceiling or deck, not subjected to any unequal strains from above, and should be well blocked off, and if polished the polished side should be well protected against chafage. When shipped in slabs it is best to stow them on their edges. Marble should be kept well away from any oil which may damage it

Margarine. See Oils, page 145.

Marjoram. This plant has several species, one of which —the Sweet Marjoram—is used in cooking on account of its sweet aroma. Usually packed in bales, it requires no special stowage.

Marl. A mixture of sands, clays and calcium carbonate and much used as a manure for fertilising.

Shipped in bulk or bags, it requires the same stowage as Manure (q.v.).

Mastic. A hard yellowish resin which exudes from the Lentisk or Mastic tree, much used in manufacturing varnish and as a tooth-stopping in dentistry. Stowage as for Resin (q.v.).

Mathie (Methey Seed). See Fenugreek.

Matte. A furnace product obtained during the smelting of sulphide ores, and consists of a mixture of sulphides, commonly copper, lead, iron, nickel, gold, etc. Matte is also called Regulus. Stowage as for Ores (q.v., page 148).

Matting. Of various kinds such as coir, rush grass, canton, etc., is variously packed, but is usually in rolls and can be stowed anywhere except under heavy cargo.

Meal. This is grain ground into a kind of coarse flour. Carried in bags, requires ordinary bag stowage.

Meat (Frozen). See Refrigerated Cargo, page 153.

Meats, Case. Preserved meats in various sized cases are largely shipped from the Argentine, Australia and New Zealand. They may be given block stowage or used as beam fillings. Cases of preserved meats should not be stowed in holds containing maize or other grain liable to sweat or heat. Much damage may be caused in this manner, as the steam destroys the labels on the tins and the heat damages the contents.

Melons. See Fruit, page 122.

Menthol. Most important constitutent of oil of peppermint, often shipped in the form of crystals in cases. Stowage as for Drugs (q.v., page 113).

Metal Scrap. Carried in bulk, may be stowed as convenient, but if rusty it must be well dunnaged and matted before overstowing with other cargo.

Methey Seed. See Fenugreek.

Mica. Mica is found in rock and is mined to a large extent in India and Brazil. It is much used as doors of stoves, etc., on account of it being translucent and changes of heat not affecting it. Shipped in paper-lined cases in sheet form, and the waste in bags, it requires no special stowage, but must be protected from salt water.

Middlings. The coarser part of flour intermediate between flour and bran, and used as a food for animals. Carried in bags, it requires ordinary bag stowage.

Milk (Condensed). This is carried in tins in cases, some of which are very lightly constructed.

Such cases should on no account be used for broken stowage, but packed in the solid as much as possible. If care is not taken these cases, being very frail, are often broken and tins dented to such an extent that they are unsaleable ; also frequently, when the tins are dented and crushed the contents leak and do considerable damage.

Condensed milk should on no account be stowed near the engine room or stokehold bulkheads or any other place where it is subject to excessive heat. It is occasionally shipped in barrels, in which case it only requires ordinary cask stowage.

Milk Powder. This is milk in a powdered form shipped in casks and cases, which require no special stowage.

Millet. A name for several kinds of seed grown and used extensively for food in India, such as Bajra and Jowar Shipped in bags and requires stowage as for Seeds (q.v.).

Minerals. See Ores and Minerals, page 148.

Mineral Oil. See Oil, page 138.

Mineral Waters. Both natural and manufactured are packed in cases sometimes divided into partitions, in straw or loose packing. They should be handled carefully and stowed in a cool dry place, as moisture will rot the packing and damage the labels. Heat may also cause the bottles to explode.

Mohair. The Angora Goat fleece which is used for dress goods, plushes, heavy cloths, etc. It is packed in bags and bales, and requires no special stowage.

Molascuit. This is an Oil Cake (q.v. for stowage).

Molasses. A by-product of sugar and much used in preparing rum and as a food.

Of late years it is mostly carried in bulk in tank steamers, but is also carried in casks and hogsheads which should be given good cask stowage. It is packed occasionally in baskets in a concentrated form.

A large quantity of Molasses is carried from Mauritius to India and is usually shipped in old casks which are often in bad condition. Care should be taken that these are well stowed " bung up " to avoid excessive leakage, as vessels in this trade have experienced serious trouble from this cause and also through these old casks collapsing.

When carried in tank steamers, if loading Molasses after oil, the greatest care must be taken to clean the holds or tanks thoroughly to avoid taint. This cargo corrodes the plating and rivet-heads very easily.

Monezite. This is sand shipped from Brazil and India. It contains a percentage of thoria that gives thorium nitrate, which is used in the manufacture of incandescent gas mantles.

It is packed in old petroleum tins and 1 cwt. bags, but requires no special stowage.

Monkey Nuts. See Ground Nuts.

Mordant. A liquid used in dyeing and carried in barrels. See Dyestuffs.

Motor-cars. Sometimes these are shipped straight from the road, and in this case the wheels should be landed on thin dunnage and the whole body securely lashed. For new cars in cases stow as Automobiles (q.v.).

Motor Cycles. These are packed in crates and cases which should be given good upper stowage and well blocked off.

Motor Tyres. Single tyres are usually wrapped in oiled paper and bound round with hessian. They may be stowed anywhere as clean upper broken stowage or beam fillings, but must be secured so they cannot move and consequently be chafed.

Mowra (**Mowhra, Mahwa, Mowa**). A Seed (q.v.) for stowage. A spirit is distilled from the Mowra flowers and used in the East.

Mucilage. An aqueous solution of gum from many trees. Stowage as for Gum (q.v.).

Mungo. A fine woollen fibre obtained from compacted rags and used in manufacturing the poorer quality of woollen goods. Stowage as for Rags (q.v.).

Munjeet. A portion of a plant which is used as a red dyestuff. Shipped in bales, casks and cases. Stowage as for Madder (q.v.).

Musical Instruments. These should be packed in tin-lined cases to prevent damage from sweat, etc. They should be stowed in upper stowage, well away from articles of a moist nature, with the marked side uppermost. Special care should be given to the careful handling and stowage of these delicate instruments.

Musk. A dried secretion from the musk deer, used both as a medicine and a perfume.

When new it has an offensive odour which is very pungent and lasting. It is usually packed in cases and should on no account be stowed in the same hold as articles of an edible nature or any goods liable to be damaged by it.

Mustard. Mustard is usually packed in tins in cases which require no special stowage.

Mustard Seed. The seed of the Mustard herb, which is shipped in bags and requires stowage as ordinary bag cargo.

Mutton. See Refrigerated Cargo, page 153.

Myrbane Oil (**Nitrobenzol**). A Dyestuff. See page 190.

Myrobalans. These are small berries used in tanning and dyeing, being shipped from Eastern ports in bags. They are not readily damaged, are free from smell, and should be stowed as ordinary bag cargo. A certain percentage of these are shipped in small " pockets " often at a reduced freight, and are used for broken stowage.

Myrobalan extract is carried in bags and cases. See Extracts.

Myrrh. A gum resin shipped in lumps in chests. Requires stowage as for Resin (q.v.).

Nails. These are packed in kegs or cases and sometimes in small heavy bags, which may be stowed anywhere, but must be carefully handled, as owing to the excessive weight of contents in comparison to the containers, if roughly handled the packages are easily broken and damage caused by loss.

If in bags they should be stowed in block form, as if stowed singly the bags will readily chafe.

Nappee. This is partly dried fish carried in the East. Care should be taken to stow it in a place by itself and in a part of the hold well clear of dry perishable goods.

The odour from this article is very objectionable, and wet nappee should be given entirely separate stowage, as it is often infested by maggots.

Naphthalene. One of the principal constituents of Coal Tar forming white crystals. It is carried in casks, but sometimes in cases, and should be stowed well away from foodstuffs and crew's quarters.

Narcoline. An extract from Opium. Stow as for Drugs (q.v.) page 113.

Nickel. This is a metal variously used in electro-plating, etc. Usually shipped in casks and cases, it requires no special stowage.

Niger (**Ramtil**) **Seed.** A black seed shipped from India in bags and from which is extracted Niger Oil. Stowage as for Seeds (q.v.). For the oil, see Vegetable Oil, page 143.

Nitrate of Soda (**Chile Saltpetre**). A white crystal substance with a bitter taste, employed largely as a fertiliser. It is usually carried in bags, and requires proper and careful stowage. It is soluble in water, and as it is liable to evaporate when stowed in a damp place must be given good dry stowage. There is an objectionable odour from this article when stowed in any quantity which may damage other goods.

It is usual to allow 3% for drainage during the passage.

In stowing full cargoes of Nitrate, it should be stepped up in the holds half bag in from the wings, and also away from the bulkheads, owing to its excessive weight, in order to make the ship easy. It settles down to a solid mass, and there is no fear of it shifting if stowed as above described.

Nitro-Naphthalene. Any nitro-derivate of naphthalene; may be freely carried with no special risk.

Nutmegs. The fruit of a tree largely used as a flavouring in cooking after grinding. Usually carried in cases and casks, but often in bags. Stow as required by the packing.

Nuts. There are many different kinds of nuts carried, such as Almond, Brazil, Cobnut, Coconut and Filbert, etc., and they are variously packed in bags, cases and barrels, usually the former, and are also frequently carried in bulk. They require to be well dunnaged, kept quite dry and stowed as required by the containers. Edible nuts should not be stowed with guano or bone dust, or any other article liable to damage them. Great care should be taken to give all nuts good ventilation, as some kinds, if new, heat easily and may cause gases dangerous to human life.

It should be noted that "nuts" and "nut kernels" come under the Board of Trade definition of Grain (q.v. page 128), and if necessary with these cargoes precautions must be taken against "shifting."

Nux Vomica. The seeds of a small tree which when ground yield strychnine. Packed in bags and packets they require no special stowage, but are poisonous.

See also Poisons, page 181.

Oak. See Timber, page 171.

Oak Extract. See Tan Extract.

Oars. These require to be placed in flat stowage to prevent distortion.

Oatmeal. This is the flour of oats. It is generally packed in bags or barrels, or in cartons. Quaker oats. etc., should be stowed according to the method of packing as general cargo, but great care must be taken to avoid damage by taint.

Oats. See Grain, page 128.

Ochre. A coloured clay which when ground is used as a mineral paint. It is usually shipped in barrels which require careful handling, as they are often too light for the contents.

Oil. See Special Cargo, page 134.

Oil Cake. Made from seeds such as Cotton seed, Linseed, Groundnuts, Niger seed, Rapeseed, Sesame seed, Copra, Mowra seed, Poppy seed, Castor seed, etc., after the oil has been extracted. The residue is then pressed into a cake (Oilcake) and used for cattle food. It is usually packed in bags but sometimes carried in bulk. Care should be taken to see that the hold is dried and the cake well dunnaged, as the slightest damp will often turn the cake mouldy and render it useless. No turpentine, tar or highly scented goods should be stowed near it or it will be unfit for use.

Oil cake often sweats badly on the voyage, so should be well ventilated. There is also risk of spontaneous combustion, as several fires have lately occurred with this cargo.

Palmist cake has a bad odour which may damage other cargo.

Oil Cloth. Usually shipped in rolls. As regards stowage, the same conditions apply as are described for Linoleum and Congoleum (q.v.).

Oiled Clothing. All materials containing oil, especially oilskins, waterproof coats, etc., are somewhat liable to spontaneous combustion. Usually shipped in cases, they should be stowed in an accessible place.

Oleo. The commercial name of an animal oil expressed from beef fat and largely used in the manufacture of margarine. Shipped in tierces, barrels and kegs, it requires no special stowage, but should be kept in as cool a place as possible and given ordinary barrel stowage.

Olibanum. A resinous gum (Frankincense) carried in bags. Stow as for Gum (q.v.).

Olives. The bitter fruit of the olive tree from which olive oil is obtained. Usually packed in casks which should be given good cask stowage. Sometimes packed in bottles and jars in cases, when they require stowage for bottled goods. For Olive Oil, see Vegetable Oils, page 143.

Onions. These are usually carried in crates and bags which require no special stowage except that they must be very well ventilated all the voyage. Stow as for Fruit (q.v.) page 124.

Opium. The solidified juice of the white poppy, of which three grades are known commercially: provision, excise, and medical opium. The balls or lumps are packed in lined chests covered with hessian. The greatest care should be taken of this most valuable freight, and the cases placed in a lock up. It should be noted if the seals are intact before receiving the chests. See also Poisons, page 181.

Opossum Skins. See Skins.

Oranges. See Fruit, page 123.

Orchil (Orchilla). See Archil.

Ores. See Special Cargo, page 148.

Orris. A dried root used in a pulverised form in perfumery and medicine. It should be stowed away form foodstuffs or any cargo liable to be affected by the odour.

Otto of Roses. A corruption of "Attar of Roses" or Rose Oil, an important Essential Oil (q.v.) page 144.

Oxide of Iron (Spent). This is Bog Ore (q.v.).

Oysters. These are shipped in barrels, in kegs or tinned, and should be stowed in a cool place, or on deck in a convenient spot. They should never be stowed below amongst dry goods.

Ozokerite. See Oils, page 142.

Paddy. This is rice in the husk. See Rice, page 158.

Paints (in Oil). Usually carried in drums and kegs, and should if possible be stowed by themselves, or with drums of oil, hardware or case goods. They should be stowed on end on flat dunnage, and between each tier boards should be laid. The whole should be well blocked off to prevent shifting. On no account should paint drums ever be stowed on their sides as the slightest pressure thereon will cause the heads to slacken and consequent excessive leakage. See also Dangerous Cargo, page 195.

Palembang. A form of Benzoin (q.v.).

Palmitin. A vegetable fat from Palm Oil. See Fats, page 145. See also Acids, page 110.

Palmyra. A tree whose timber, leaves and fibre are all used in commerce. Shipped in various packings which require no special stowage.

Palm Kernels. See Kernels.

Palm Leaf. The leaf of a palm used for making hats, fans, etc. Packed in bales, bundles, seroons, etc., they should be kept dry, but otherwise require no special stowage.

Palm Oil (Palm Kernel Oil). See Vegetable Fats, page 145.

Paper. This is now usually shipped in rolls, though it may be packed in bales and cases, in which event it may be stowed as ordinary general cargo according to the method of packing, taking particular care against damp or chafage. Heavy rolls usually termed "newsprint" require very careful stowage as the slightest damage at the ends will practically ruin the whole roll. They should be stowed on a level floor on their ends if possible, to avoid the roll becoming distorted and render them useless, as they are required to revolve evenly in the machine. Hooks must on no account be used either for handling or lifting, and care should be taken that the edges are not damaged by coming in contact with hatch coamings or other obstructions when loading or discharging.

Small rolls about 21″ in height, usually termed "cheese rolls" on the Pacific coast, are frequently carried, and they make very useful beam fillings, etc.

Paraffin. The popular name for burning oil. See Kerosene p. 138. Also a Wax (q.v.).

Paratron. A rubber solution packed and carried under the same conditions applying to Gutta Percha Solution (see page 192).

Paris Green. See Arsenic Acid, page 107, also page 195.

Patchouli. An Eastern herb from the leaves of which a powerful scent is extracted. It has a pungent odour and therefore must not be stowed near foodstuffs. The oil is an Essential Oil (q.v., page 144).

Patent Fuel. See Briquettes.

Peanuts. See Ground Nuts.

Pears. See Fruit, page 125.

Peas. These are packed in bags or sometimes shipped in bulk, and require no special stowage other than that given to ordinary bag cargoes.

Peel. See Candied Peel.

Pelts. These are the skins of animals, especially sheep and goats, with the wool removed and are shipped in casks or kegs, which should be given good cask stowage. This being somewhat valuable cargo, care should be taken to see that casks are in good condition before shipment, and if not, have them re-coopered before loading. They should not be stowed near dry cargo, as the brine may leak from the casks during the voyage.

Pepper. The household condiment. It is usually shipped in double bags, but also in boxes and barrels, and should be well ventilated, as pepper occasionally sweats very much and gives off pungent fumes. It should not be stowed amongst such goods as would be damaged by contact with it.

Peppermint. A strong scented herb much used as a flavouring and in medicine. It is usually packed in cases which should be stowed well away from foodstuffs. The oil is used as an Essential Oil (q.v., page 144).

Perfumery. See Drugs and Essential Oils, pages 113 and 144.

Periodicals. Packed in bags, bales, bundles, etc., they require no special stowage, but great care should be taken to avoid chafage. They should be stowed in an easily accessible place such as the hatch squares, so as to ensure an early discharge.

Petroleum Jelly. This is Vaseline (q.v.).

Petrolatum. A substance derived from petroleum and used in ointments. Stow as Vaseline (q.v.).

Phosphates. These are mineral deposits largely used as fertilisers. Carried both in bulk and in bags, they require no special stowage.

Phosphate Rock. Vast beds of this mineral exist in America. It is carried in bulk and should be stowed as Ore (q.v.) page 148. Phosphate easily absorbs moisture, and great care should be taken to keep it dry, as this commodity is bought and sold on a moisture basis.

Pianos. These are packed in strong cases and should be given good case stowage as general cargo, the right way up and well blocked off.

Piassaba. Fibre obtained from a Brazilian palm and much used in making brushes and brooms. Generally packed loose or in bags and cases, it requires no special stowage.

Piassaba should never be used as dunnage for dry goods, as it holds moisture.

Pickets. See Timber, page 171.

Pigs. See Refrigerated Cargo, page 153.

Pimento. A spice shipped in bags. Stowage as Allspice (q.v.). The oil obtained is an Essential Oil (q.v., page 144).

Pineapples. See Fruit, page 125.

Pine. The general name for a large number of trees. See Timber, page 171.

Pipes. There are such a large number of different kinds of pipes that it is almost impossible to lay down definite and concise rules regarding their stowage without making quite a long article on these particular goods. Cast iron pipes are generally shipped singly and have to be carefully stowed, first of all because they are so liable to breakage, and secondly because they occupy such a large amount of space in comparison to their weight.

Cast iron pipes of say 6″ diameter and upwards with flanges, should be stowed fore and aft with wood laid underneath athwart ships of sufficient height to keep the bell or flange clear on the ground tier. The tier above should be reversed, so that the bell is clear and stowed in the cantline of the tier below; reversing the bell or flange in the following tier, and so on the whole way up in the hold. On no account should these pipes be stowed athwartships, as in event of one end getting hung up in any way, breakage is bound to occur. Where a large quantity of cast iron pipes are shipped of varying sizes it is then often possible to " nest " them—that is to say put the smaller ones inside the larger—and so save considerable space. As these cast iron pipes are usually shipped unprotected they require very careful handling.

Wrought iron pipes, such as gas pipes, etc., are shipped singly and in bundles; and must be stowed according to their size, weight and method of packing, but in all cases they must be stowed carefully on an even bed, preferably fore and aft, and great care must be taken to avoid bending, as large claims are continually arising from this cause.

Pistachio Nuts (**Pistaccia**). The fruit of a South European tree used in confectionery. Stowage as for Nuts (q.v.).

Pitch. This is a product of coal tar, and is an inflammable article. Very often it is carried in bulk, when precautions should be taken to prevent it running and adhering to the vessel. The ceiling should be saw-dusted, and the vessel's sides limewashed. It should not be loaded in bulk in hot weather or to ports experiencing hot weather.

Small quantities are usually shipped in casks or barrels with general cargo. In this condition it is often the cause of great difficulty, as the casks are usually old and weak, heavy leakage generally occurs and the barrels collapse, with the result that the consignments run into a solid mass, and has been known to greatly damage other cargo. After many trials it has been found the best way to stow a consignment of pitch in barrels is to stand them on end, and put plenty of level boards between the tiers. Some full cargoes are now carried in barrels, and it is found that barrels are usually best stowed on end here also.

Pitprops. See Timber, page 171.

Plants. These are generally carried in crates. All plants or shrubs are usually required to have special cool stowage on deck, or in a cool place such as a vegetable locker; but the stowage depends entirely on circumstances such as the nature of the plant and intended voyage, etc.

Plaster of Paris. See Gypsum.

Plumbago. See Blacklead.

Plywood. See Timber, page 172.

Poisons. See Dangerous Cargoes, page 181.

Pollard. This is meal and bran mixed, and is usually carried in bags. Stowage as bagged Grain (q.v.), page 128. Pollards must be well dunnaged, matted and ventilated, as it is very liable to sweat.

Pongee. A soft fabric of dyed and undyed silk shipped from the East in cases or bales. Stowage as for Silk (q.v.).

Pontianac. This is a form of wet rubber usually known as Jelotong (q.v.).

Poonac. This is coconut cake. Stowage as for Oilcake (q.v.).

Poppy Seed. A seed from which opium is derived, and used as a cake for cattle food. Stowage as for Seeds (q.v.). It is very small and light, and consequently special precautions must be taken when stowing several seeds in bulk to prevent "mixture."

Potash. This is the name given to the chemical combinations of potassium. It is usually packed in casks and kegs. Stowage as for Chemicals (q.v.) page 113.

Potatoes. These are usually shipped in barrels, bags and sometimes in cases, and should be stowed by themselves if possible. Full cargoes require careful stowage and plenty of ventilation.

They will lose weight during the voyage, and there will often be about 10 to 15 % shortage. For ship's stores they can be kept for months in good condition by sprinkling them with a small quantity of air-slaked lime, picking them over now and then and rubbing off the sprouts.

Poultry. On some coasts such as India, China, etc., much poultry is carried " alive " in crates and baskets. These must be stowed according to circumstances and the method of packing, but each package must be separately accessible as in event of a prolonged passage they may need attention.

For poultry carried " dead," see Refrigerated Cargo, page 153.

Precious Stones. See Precious Cargo, page 150.

Premier Jus. This is a kind of Tallow (q.v.)

Prunes. The dried fruit of the plum; usually packed in cases and should be stowed as ordinary dried fruit. Care is necessary, however, in stowing this class of goods when working over a tier of these cases in the hold or in a barge, unless boards are laid down, as the cases being light will be damaged and broken. If space will permit, it is advisable that when a tier is completed in the hold as high as it is possible to stow it, a layer of dunnage should be placed, and the next say 5 or 6 tiers stowed on this, and so on, till the hold is full. It is a good plan to stow these cases on edge or end when stowing in a barge, as the tops are frail and often broken by the men walking on them. They should always be worked on trays or boards.

Pumice Stone. A grey-coloured rock much used as a smoothing and cleaning substance. It requires no special stowage; but it is sometimes shipped in a powdered form in bags, in which case it requires careful handling, as the bags are usually frail.

Pyrites. Any number of metallic sulphides, such as copper, sulphur, etc., of which iron pyrites or pyrite is the commonest. Stow as for Ore (q.v.), page 148.

Quassia. A drug yielded by several varieties of tropical American trees. The bark is intensely bitter, and is used as a tonic. Stowage as for Bark (q.v.). See also Timber, page 172

Quebracho. See Timber, page 172.

Quillia. The bark of the Quillia tree of which the inner layers are used in soap making and also for washing silk and printed goods. Stowage as for Bark.

Quinine. See Drugs, page 113.

Rabbits. See Refrigerated Cargo, page 153.

Rabbit Skins. These are usually packed in bales. They are valuable and should be given good dry stowage, and be well protected from chafage and against damage by contact with iron, dirt, etc.

Raffia. This is Bast (q.v.).

Rags. These are shipped in bales and bundles. They should never be stowed near oil or greasy articles, being liable to spontaneous combustion ; and should be given stowage in the square of a hatch away from articles of an edible nature. Care should be exercised when accepting these bales if from a port where there is a liability of their being infected with plague or cholera, as the great objection to these packages is that they may convey contagion and vermin from port to port, and in some places are only landed after much formality and great difficulty.

Railway Iron (Steel Rails). Formerly steel rails were often carried as full cargoes, but this seldom happens nowadays (except perhaps in small vessels in the coasting or near foreign trades) for they are usually carried in large or small parcels with other cargo.

In stowing a large shipment of railway iron, consideration must be given to the amount to be stowed in order that it may be distributed over the ship, having regard to the matter of trim and making the vessel easy in a seaway.

In stowing railway iron amongst other cargo it should always be stowed fore and aft and well secured. If it happens that the vessel is not full, and there is no other cargo available to secure the rails, they must be well tommed down from the beams, placing the toms say 5 or 6 feet apart, and also well wedged at the sides.

Railway Material. This comprises locomotives and many other heavy articles which frequently constitute heavy lifts. The smaller articles are generally shipped in cases, but they are usually of a heavy nature and should be stowed as such. Wagon wheels should be stowed athwartships with the flanges of one pair against the axles of the next pair, then other small cargo can be stowed under and over the axles between the wheels.

Raisins. See Fruit, page 127.

Ramie. A grass peculiar to Borneo, Malay, China and Japan. It is noted for its strong fibrous stem, which produces a silky kind of flax. Shipped in bales, it should be given stowage as for Hemp (q.v.).

Ramtil. See Niger Seed.

Rape Seed. A small dark seed from which oil is extracted, the residue being used as an animal foodstuff. Wild Rape Seed is shipped in bulk from the Black Sea and is usually of an inferior quality. The Indian variety is usually shipped in bags, and these require ordinary bag stowage. When shipped in bulk it is necessary to see the limbers are well caulked, as this seed, being small and hard, will run easily. Bulkheads and partitions in holds should be lined with burlap. Rape Seed Oil is Colza Oil (q.v.) page 143.

Rattans. These are the long flexible stems of an Indian plant usually known in Europe as canes, and used for many purposes such as basket making, chair bottoms, etc., etc. The inferior kinds are often used as dunnage and broken stowage.

Red Sanders. See Timber, page 172.

Redwood. See Timber, page 172.

Regulus. Impure metal. See Matte.

Resin. This is the name given to certain vegetable substances obtained from collecting the juice of various trees. True Resins are inflammable, and when cooled are hard and insoluble in water, though soluble in alcohol.

Resins are shipped under various names; the following are the principal: Amber, Copal (or Gum Resin), Dammar (Gum Dammar), Guaiacum, Mastic, Dragon's Blood, Acaroid (Red and Yellow), Shellac, and Colophony (Rosin). See under their respective headings for stowage.

Retorts. These earthenware articles are often stowed loose and unprotected. They should be carefully handled to prevent breakage, and given good flat stowage and well blocked off.

Rhea. This is Ramie (q.v.).

Rice. See Special Cargoes, page 158.

Rope. Made of various articles such as wire, manilla, coir, flax, hemp, cotton, etc., and is generally shipped in coils covered with burlap or bagging, which is sometimes tarred. Should be well stowed and great care must be taken to properly chock the coils to avoid any chafage.

The smell of rope will often damage tea, macaroni, flour, sugar, etc. if stowed in the vicinity.

Rosin. Colophony (or Common Rosin) is shipped principally from America and is used for making cheap varnishes and soaps, etc.

It is usually packed in dry casks of a special kind used for this purpose only. They are thick in the staves with straight sides. The rosin is poured into the casks and when cold solidifies and forms a solid mass so that the cask become merely a casing to the solid block of rosin. They require very careful handling, and in every consignment many casks are usually broken. Large quantities are shipped from ports like Jacksonville, Savannah and Brunswick. When stowed, as is often done, with prime lumber, some separation should be placed between, otherwise lumber is damaged.

Rubber. This is shipped in many commercial forms, crude or manufactured, etc. Raw rubber, which consists of Caoutchouc (q.v.) mixed with resin and other substances, is usually carried in bags, bales, cases and chests, and may be stowed as desired on short voyages. On long voyages it should be stowed away from articles of a moist nature as it is liable to spontaneous combustion.

Moist rubber should be stowed by itself as for Jelotong (q.v.). Scrap rubber is usually carried in bags which require no special stowage.

Para rubber—the best type—is variously shipped as blocks, sheets, strips, etc. usually in cases which require no special stowage; but all such rubber must be kept thoroughly dry.

Rum. See Alcoholic Liquors, page 112.
Runners. See Casings.
Rye. See Grain, page 128.

Safflower (Kardi). A herb cultivated for its flowers giving pink, crimson and scarlet colours much used in dying silk. Packed in bags, bales and cases; must be given good dry stowage according to packing. This herb gives Carthamas oil.

Saffron. A herb which yields an orange-coloured bud, and has a bitter taste. It is used as an orange dye and in medicine. Is of considerable value, and should be carefully stowed in a cool dry place.

Sago. A variety of starch extracted from the trunks of the sago palm. It is usually packed in bags, boxes and casks and should be well stowed amongst dry goods only, free from any articles liable to damage it by taint. Called also Sago Flour.

Sal-Ammoniac. This is Ammonium Chloride and used largely in the chemical industry. It is usually carried in casks and barrels and requires no special stowage, but must be kept perfectly dry as it absorbs moisture. In case of leakage wash out with water and do not use lime at all.

Salicin. A bitter extract obtained from tree trunks and used medicinally. See Drugs, page 113.

Salt. Salt is often carried as full cargoes in bulk and requires no special stowage, but particular care must always be taken to see that the holds are thoroughly well cleaned before commencing to load, and all ironwork should be covered with mats or burlap. When carried in small quantities in bulk, precautions should be taken as to what other cargo is stowed adjacent to it, as it absorbs moisture; and there is always a certain amount of drainage from it that will damage other cargoes.

Sometimes it is carried in bags and casks, in which case it can be stowed anywhere by taking due precautions as above.

Rock Salt is carried in bulk or bags and can be treated in the same manner.

Saltpetre (Nitrate of Potash). This is a colourless solid having a salty taste and is a powerful oxidising agent, much used in pharmacy, as a brine, and as a manure, etc. The stowage of saltpetre requires great care and it should not be stowed near inflammable articles such as oil, tallow, grease, etc., or it may cause a serious explosion. This is heavy cargo and is usually given lower hold stowage. If other dry goods are stowed over it, dunnage and mats should be laid between.

Before stowing saltpetre in a hold which has previously carried oil the bilges should be thoroughly washed out, as the mixing of oil and saltpetre will form a highly dangerous compound. Saltpetre should not be stowed near sugar.

Sand. Many varieties are carried, usually in bags, which require no special stowage.

Sandalwood. See Timber, page 172.

Sapanwood. See Timber, page 173.

Sardines. These are usually tinned in oil and packed in cases which should receive ordinary stowage for Canned goods (q.v.).

Sarsaparilla. Made from the root of a plant, much used as a cooling drink which is considered good for the blood. It has no objectionable qualities. Cases of bottles should be stowed as Alcoholic Liquors (q.v.) page 112.

Sausage Casings. See Casings.

Savin. See Poisons, page 181.

Scheelite. Usually known as Tungsten, and is a mineral much used in the manufacture of a hard steel. It is carried in bags and requires no special stowage.

Scientific Instruments. These may consist of any valuable scientific articles which should in all cases be carefully handled and given special stowage in a "lock up" or spare cabin if possible.

Seal Oil. See Oil, page 145.

Seed Lac. See Lac.

Seeds. These are of many different kinds and include Aniseed, Beniseed, Canary, Carraway, Carthamas, Castor, Clover, Cocksfoot, Coriander, Cummin, Fennel, Gingelly, Grass, Hemp, Jowari, Linseed, Millet, Mowra, Mustard, Niger, Poppy, Rape, Sesame, Sunflower, etc. Some small seed consignments require to be packed in airtight cases when being carried through the tropics or their germinating powers will be destroyed. Seeds all require good dry stowage, and must be guarded against wet or any damp article, as they may become heated.

Bags of seeds sometimes lose considerable weight on a long passage.

When seed is stowed in bulk it must be stowed as for Grain (q.v., page 128).

Great care must be used in stowing some seeds which are very valuable. Such seeds are usually packed in bags of very close texture and further enclosed in a second bag or wrapper. In stowing small quantities of this class of cargo amongst general merchandise the packages should be well protected from damage by other goods coming in contact with them or by chafage. Single bags of seed have often been stowed between light case goods and during the voyage have been chafed and the contents almost wholly lost amongst other goods.

Great care is necessary with seeds of a small nature, such as rape and poppy seed, when stowing several seeds or grains together, to see that no mixture takes place. If at all possible, it is always advisable to stow such small seeds below and not on top of large seeds.

Semitin. A class of bran—or fine quality middlings—

shipped from South America in bags. Stowage as for bagged Grain (q.v.), page 128.

Semolina. This is the name given to the particles of grain obtained when grinding wheat and is used as a food and in manufacturing macaroni. Requires no special stowage.

Senega Root (Snake Root). A dried root of a North American plant and known as Snake Root on account of its use as an antidote to snakebite. Used medicinally, it is shipped in bales and requires to be kept dry.

Senna. Dried leaves of the various species of genus Cassia, used for medicinal purposes. They are packed in bales and bags and require stowage as for Cassia (q.v.)

Sesame (Sesamum). Also called Gingelly, Til or Teel Seed. See Seeds.

Sharks Fins. These are dried before shipment and have a disagreeable odour and in consequence should not be stowed with anything liable to be damaged thereby.

Sharps. Same stowage as Middlings (q.v.)

Shea Nuts. The fruit of the Shea tree from which Shea butter is obtained. For stowage see Nuts.

Sheep Dip. This is variously carried in drums, kegs and other packing, mostly in the liquid form. The contents are poison and should be given special stowage, if possible away from other cargo. See also Dangerous Cargo, page 198.

Sheepskins. See Skins.

Shellac. See Lac.

Shells. Shells of different kinds such as Tortoise, Mother of Pearl, Oyster, etc., require special stowage according to the nature of the package.

Tortoise Shell, which is the horny shell of the tortoise, is usually packed in cases or chests which should be stowed amongst dry goods as choice freight.

Mother of Pearl Shells, the inner coating of which are much used to cover articles of ornament and for inlaying furniture The better grade shells are packed in cases and should be given good stowage in a safe place if declared valuable.

The more common or rough shells are usually shipped in bags and require no special stowage, but must not be used for broken stowage or have heavy weights stowed above them as they are liable to breakage.

Oyster shell, usually shipped crushed for poultry food, is carried in bags and requires no special stowage, but it must be carefully handled when discharging as it will often be found that the bags are cut and chafed by the contents and much loss is sustained if not handled carefully. Care must also be taken to see that these shells are not contaminated by other cargo such as brine from salt hides, etc., as heavy claims have resulted from such taint.

Shingle. See Ballast, page 220

Shingles. See Timber, page 173.

Shooks. See Timber, page 173.

Shoyu. See Soy.

Silicon Carbide. This is the chemical name for Carborundum (q.v.).

Silica (Silex). A mineral ; the principal constituent of flint. Used in the manufacture of glass, stoneware and mortars. It is usually carried ground in bags which require no special stowage.

Silk. This is fibre obtained from the silkworm and other insects, much used for manufacturing articles of clothing. It is usually packed in bales and cases, and as this is valuable it must be stowed in a safe place. and carefully handled so as to prevent any damage to it. It should not be stowed near oil, tar, grease or any such articles and it must also be kept well away from iron stanchions and coamings, and be well dunnaged and matted.

Silk waste is carried in bales, and requires the same precautions.

Silver. See Precious Cargo, page 150.

Sisal. The fibre of the American aloe used for cordage. Stowage as for Hemp (q.v.).

Skins. "Skins" generally only means those of sheep, calves, goats, etc. They are usually carried in bales, when they require good stowage and protection from wet or rust, etc. Marsupial skins are usually carried in bales and require similar precautions. Skins are sometimes carried salted and pickled in casks and then require good cask stowage.

Slag. The fused mass obtained as a bye-product in many smelting processes. "Basic Slag" is the waste from smelting iron by the basic process. It contains much phosphoric acid and is used in many ways, but largely shipped as a valuable fertiliser. It is carried in bags and bulk and should be stowed by itself if possible, but if stowed with general cargo all case goods or other articles liable to be damaged by its thick dust must be carefully covered over when working slag.

Slates. Slates are usually shipped loose and should be stowed on their edge with plenty of straw ; preferably with battens between each tier. Slate slabs require great care in stowing as they are easily broken and should always be stowed on edge and well blocked off, the same as for Marble slabs (q.v.).

Sleepers. See Timber, page 173.

Soap. Manufactured hard soaps are usually packed in cases and may be stowed anywhere amongst general cargo. Fancy toilet soaps are usually in cardboard boxes packed in cases, which are often very frail, and should be carefully watched to prevent pilferage. Soft soap, however, is usually carried in kegs, firkins and half firkins, and should be given good upper stowage in a cool well ventilated place and not near goods liable to damage, as the kegs, often frail, are liable to leak.

Soda. The usual name for Sodium Carbonate, also Soda Ash, and is largely used for washing purposes. It is carried in bags, kegs and casks, and should be stowed by itself in an upper deck if possible, but if stowed with a general cargo must be kept well away from galvanised and other iron goods. It is not advisable to stow soda with dry goods, as it absorbs damp and often melts.

Soda, Bicarbonate of. This is a white powder and with cream of tartar goes to the making of baking powder. Usually packed in kegs or bags, it should be given careful stowage in a dry place, with no weight on top. Being a foodstuff it must be kept well clear of any article that would contaminate it.

Sodium. A metal which readily oxidises in air and combines vigorously with water. Can only be kept in liquid devoid of oxygen, e.g., naphtha. Sodium Nitrate (Chili Saltpetre), Sodium Chloride (Common Salt), and Sodium Carbonate (Soda Ash or washing soda) are all given under their respective headings. These articles are usually carried in bulk and bags, whereas the majority of other compounds of Sodium would be carried as Chemicals (q.v.) page 113. See also Dangerous Cargoes, page 198.

Sorghum. Sometimes known as Guinea Corn or Guinea Maize. See Seeds.

Sowa (Soya) Seed. See Dill Seed.

Soy (Shoyu). A sauce largely used in Japan and China made from Soy beans mixed with coarse wheat. It is usually carried in casks, which should be given good cask stowage, and if in tubs should be stowed in tiers with a board between each tier and without any weight on it.

Soya Beans. The fruit of a herb which has of late years been shipped in large quantities from Manchuria in bags.

It is largely employed as a source for oil which is used for various purposes, edible and otherwise. It is sometimes shipped as a full cargo and requires stowage as ordinary bag cargo, matting and dunnaging well, and paying particular attention to the ventilation as it often sweats heavily.

Many shipowners when chartering for bean cargoes have been prevailed upon to accept shipments of Soya Bean oil to be carried in ballast tanks. This is in our opinion a bad practice unless carried at shipper's risk owing to the possibility of oil being mixed with a certain amount of salt water and/or dirt in the ballast tank. Many claims have arisen on this account.

Difficulty is sometimes experienced in pumping this oil out as its viscosity is easily affected by changes of temperature, and detention sometimes occurs and claims often arise for short delivery.

Soya Bean Cake. See Oilcake.

Spaghetti. A foodstuff like Macaroni. Stowage as for Vermicelli.

Spar. The name of a type of mineral and especially Heavy Spar which is Barium Sulphate. Stowage as for Minerals (q.v.) page 148.

Specie. See Precious Cargo, page 150.

Spelter. The trade name given to Zinc, and also to an alloy of copper and zinc. It has a brilliant white colour, and is usually carried in ingots. If possible these should be stowed on a good even floor to prevent breakage. Providing its excessive weight will allow it without affecting the vessel's stability, the best possible place to stow this is at one end of a tween deck.

Spermaceti. See Wax.

Sperm Oil. This is a liquid wax. Stowage as for Oils (q.v.) page 145.

Spices. These are the productions of plants that have a sweet smell but a pungent taste, and are much used as a food flavouring. They include such articles as Allspice, Cinnamon, Cassia, Nutmegs, Mace, Cloves, Carraway, Ginger, etc., most of which are included under their respective headings.

They are usually packed in cases, bags, and sometimes in casks, and must be treated as choice freight and kept well away from damp or objectionable articles liable to damage by contact.

Spirit. See Alcoholic Liquors, page 112.

Sponge. The covering of cells of minute animals. It is usually shipped in bales but sometimes in baskets, and occasionally has a musty smell which must be taken into account when stowing, otherwise it requires no special consideration.

Starch. A vegetable substance made from potatoes, rice, wheat, etc., and used in many ways. It is usually shipped in casks and cases, and should be stowed as dry goods well away from all ammoniacal stuffs such as soda, saltpetre, potash, etc. Starch will absorb moisture from any wet cargo stowed near it.

Staves. See Timber, page 173.

Stearin. A preparation from natural fat, sometimes used in the manufacture of margarine and has a disagreeable sickly flavour. It is shipped in casks and requires ordinary cask stowage. See also Fats, page 145, and Stearic Acid, page 111.

Steel Rails. See Railway Iron.

Steel. See Iron and Steel.

Stick Lac. See Lac.

Stinkwood. See Timber, page 174.

Stones. Under this heading would come Ancaster, Basalt, Bath Stone, Caen, Craigleith Sandstone, Dolomite, Freestone, Granite, Marble, Millstone Grit, Porphyry, Portland Stone, Purbeck and Yorkshire Flap, most of which are mentioned under their respective headings. Ordinary broken granite or other rough stone should be stowed in a similar manner to Ores (q.v.) page 148.

Strawberries. See Fruit, page 125.

Strontia. The oxide of the metal Strontium. Carried as Chemicals (q.v.) page 113

Structural Material. This comprises such things as steel girders, etc., which do not require any special stowage and must be stowed according to circumstances regarding shape, weight, etc., but they should be stowed on a flat surface, so that they do not buckle during the voyage.

Succory. A corruption of Chicory (q.v.).

Sugar. See Special Cargoes, page 163.

Sugar Candy. A crystallised form of sugar, shipped in casks, tubes and cases. It must be given good cool stowage to prevent damage by moisture.

Sugar Beet Pulp. The pulp obtained from the Beet roots from which sugar is now largely manufactured. This is often carried in bags which should be carefully stowed in an accessible position. It is liable to spontaneous combustion.

Sulphates. The salts of sulphuric acid. Sulphate of soda and potash are the two most usually shipped in bags, which should be stowed as ordinary bag cargo, but must be carefully handled as they give off a great dust which may damage other goods.

Sulphur. A yellow brittle mineral which is largely used in manufacturing sulphuric acid and gunpowder, etc. It is usually carried in bulk, but occasionally in small quantities in rough bags. The better manufactured kinds are shipped in cases or barrels, and fine powdered sulphur called Flowers of Sulphur is shipped in barrels and kegs.

When carried in bulk the limbers must be covered to prevent the bilges getting choked. If in cases or bags they should be stowed by themselves well away from all articles of an edible nature.

Sulphur is readily inflammable and on burning gives off the suffocating fumes of sulphur-di-oxide. In emergency, gas masks must be brought into use and if fire takes place, use water freely. With reasonable precautions no danger should be attached to this cargo. On account of danger by sparks, matches, etc., it is better to have the ventilators covered.

If the holds are being washed out preparatory to loading this cargo, fresh water should be used, as salt water leaves a deposit which in combination with the sulphur, effects corrosion of the vessel's plates and steel work.

Sultanas. See Fruit, page 122.

Sumac (Sumach or Rhus). The powdered leaves of a poisonous shrub with a yellow appearance used in dying and tanning, etc. It is usually shipped in bags and bales and has rather a sickly smell, especially after having been loaded for a while.

If carried in bags it creates a dust when being worked, and other cargo liable to be damaged should be well covered. Being a very dry article, it should not be stowed near moist or damp goods.

Sunflower. The large grey seeds of a herb much used as a source of oil and as a poultry food. Stowage as Seeds (q.v.). For the oil, see Vegetable Oil, page 143.

Superphosphates. This is phosphate treated with Sulphuric acid and is valuable as a soil fertiliser Stowage as Manures (q.v.).

Sursee Seed. This is Rape Seed (q.v.).

Syrup. This term covers treacle or all liquids with sugar in solution which is usually carried in casks and kegs and should be given good cask stowage. These casks being very heavy it is advisable not to stow more than 2 or 3 heights in the tween decks. Great care is required in handling them, as owing to the excessive weight, the can hooks, if used, may start the chime and leaky casks result. Sometimes carried in tanks, for which see Molasses. When packed in cans in cases it should be stowed as Canned Goods (q.v.).

Tagua (Corozo Nut). The palm which yields the vegetable ivory. The seed is composed of a close-grained and hard substance resembling the finest ivory in texture and colour.

The seeds would be carried in bags and require no special stowage.

Talc. A silvery white stone used as French Chalk and for various other preparations. Requires no special stowage.

Tallow. A clarified animal fat largely used in manufacturing soap and candles. It is usually carried in casks which should be kept well away from heat such as engineroom bulkheads. They should be given good solid cask stowage and never stowed over dry or valuable goods. In some trades it has been the custom to stow casks on their ends in the upper decks topped off with wool. This is not advisable if much weight may come on them, as the casks, being on end, are liable to spread and leak at the staves.

Second-hand casks are often used and these should be noted on the bill of lading and special care taken in handling and stowing. If carried in cases they should be stowed as Lard (q.v.).

Tamarinds. These are the fruit obtained from a tree of that name and largely used in the manufacture of chutney and other condiments.

Dry tamarinds in bags and cases require no special stowage, but wet preserved tamarinds in casks should be given wet stowage.

Tan Extract. A liquid obtained from the root of the chestnut tree which is usually packed in old casks. See Extracts.

Tanks. These are shipped in many different sizes and shapes. They are sometimes packed with valuable seeds, confectionery, etc., are air-tight, and require stowage according to circumstances.

Tannin. A substance used in converting raw hides to leather, hence the name of the process. Carried in cases and in the form of extracts, and requires no special stowage. See also Tannic Acid, page 111.

Tapioca. A starchy foodstuff that is expressed from the juice of a herb. It is usually packed in cases and bags, which should be stowed amongst dry goods, only away from scented articles liable to damage it.

What is termed Flake Tapioca will take a taint very easily, and large claims have resulted by this being stowed with goods giving off odour.

Tapioca "Flour" and roots are also carried in bags which require ordinary bag stowage. The fine-grained tapioca is termed Pearl Tapioca.

Tar. See Dangerous Cargoes, page 199, and Tar and Tar Oils, page 142.

Tares. A forage crop known also as Vetch. Stowage as Seeds (q.v.).

Tartar. The deposit from fermented wines in the form of a hard crust. Tartar is coloured by the wine and when purified is white and called Cream of Tartar.

Cream of Tartar or Argol is used as a mordant in dyeing and for the manufacture of baking powder, etc. It is usually packed in kegs and bags which should be given stowage as foodstuffs.

Tartaric Acid. See Acids, page 111.

Tarras (Tarrace, Tarrass, Terrass). An earth of volcanic origin and used in making various kinds of cement. Carried usually in kegs, it requires no special stowage.

Tea. In bygone days this was a special trade carried on by the old tea clippers which were usually exceptionally fast sailing vessels; but nowadays, although the quantity of tea carried has increased enormously, it is seldom if ever one hears of a ship carrying a full cargo of tea. Little can be said about the stowage of tea, as it is shipped in regular sized cases which are easily carried and present little difficulty in stowage, except that great care must be taken when stowing tea to see that no cargo which gives off any odour whatever or is liable to sweat is stowed in the same hold.

The common practice in vessels coming from the Far East and Burma is to leave sufficient space, or utilise space occupied by cargo to be discharged in Ceylon, and then fill this up with tea for European ports.

Black tea is usually shipped in 100 lb. chests which are soldered and rendered airtight.

Tea waste or refuse is the chief source of Caffeine (q.v.).

Teasel (Teazel). These are parts of a plant used in cloth manufacture. Shipped in bags which require no special stowage.

Teel Seed. This is Sesame Seed (q.v.).

Teff. An important Abyssinian grain plant which yields a white flour of good quality. Stowage as for Seeds (q.v.).

Terra Japonica. Pale Catechu or Gambier (q.v.), so called because when it was first imported into Europe it was thought to be an earth.

Thermite. A mixture of powdered aluminium and iron oxide used for welding. Requires no special stowage.

Thus. A resin known to the ancients as Frankincense. Stow as for Resin (q.v.).

Thyme. A plant which gives an Essential Oil (q.v.) page 143. The powdered roots are also shipped in bales, and should not be stowed with articles liable to be tainted by their aroma.

Tiles. Usually carried in bulk. In large quantities they require to be carefully stowed with straw between each layer, and should have no weight stowed above them. Small quantities are shipped in crates and cases and require no special stowage

Timber. See Special Cargoes, page 164.

Timothy Seed. The seed of a hard fine small grass. It is usually packed in very close woven duck canvas bags specially sewn. Stowage as Seeds (q.v.), but care must be taken to guard against the slightest chafage as the smallest of holes will allow the seed to run. On no account must hooks be used in the handling of this article.

Tin. A metal that gives the popular name to tin plate. It is usually shipped in ingots or blocks, and requires no special stowage.

Tin Plates. Iron is covered with another metal, zinc or tin to prevent rusting. When the coating is imperfect the presence of moisture will cause the iron to rust, and if tin be the other metal the rusting is very rapid, because iron and tin form a galvanic couple, and electrical action hastens the oxidation of the iron. The method of packing tin plates varies considerably according to the different specifications under which it is purchased, but it is usually packed in small cases of specially dried wood, though for long voyages the best of tin plates are generally enclosed in an outside tin envelope and this covered by a light case.

The only care necessary in stowing tin plates is to see that they are stowed flat to prevent distortion and consequent breakage of the cases, and they must be always and at all times kept perfectly dry. They should not be stowed in a hold where an appreciable quantity of condensation is likely to occur, as the slightest moisture will cause rust which will easily damage them.

These cases must always be handled very carefully, as the packing is usually much too light for the contents.

Tincal. Crude Borax (q.v.) for stowage.

Tinned Fish. Packed in cases, and should be stowed as ordinary Canned Goods (q.v.).

Tobacco. This is usually carried in bales, cases or hogsheads as the unmanufactured raw or leaf tobacco. Ships seldom if ever nowadays load full cargoes, but they carry more or less large consignments. As far as stowage is concerned, great care must be taken to avoid it coming in contact with any moisture, otherwise it will become mildewed and rendered practically useless.

When stowing tobacco, due consideration must be given to what articles are stowed adjacent to it or in the same hold It should be kept well clear of any article such as oil, turpentine, etc., as the odour will damage goods of an edible nature, such as flour, arrowroot, etc.

It should be well ventilated, as the raw tobacco is very likely to heat and will damage by sweat. The more refined tobacco, for example, Turkish shipped from Asia Minor, is packed in very fine pressed bales, and these should be carefully stowed and well protected against chafage.

Tomatoes. For fresh tomatoes, see Fruit, page 125. For the canned tomatoes, stow as Canned Goods.

Tongues. For fresh tongues see Refrigerated Cargoes, page 151. For preserved tongues see Canned Goods.

Tortoise Shell. See Shell, Tortoise.

Tow. This is the waste hemp shipped in bales with usually a hessian covering. Stowage as Hemp (q.v.).

Tragacanth. A gum found largely in Turkey and Persia, and used as a substitute for Gum Arabic. Stowage as Gum (q.v.).

Treacle. This is carried usually in barrels and kegs, but sometimes in cans packed in cases. Stowage as for Syrup (q.v.).

Trefoil. A kind of clover seed, but larger and of a more yellowy colour. Stowage as for Seeds (q.v.).

Tubes. See Pipes. Mannesmann Tubes are large valuable tubes exported in lengths of about from 10 to 40 feet.

They should be given stowage as Pipes (q.v.), and great care taken to see that sufficient dunnage is used to have the flanges all clear.

Tulip Wood. See Timber, page 174.

Tungsten. Chiefly found as the mineral Wolfram (q.v.). Sometimes shipped as the concentrate in bags. Requires no special stowage.

Tupelo. A gum obtained from a North American tree. Stowage as for Gum (q.v.).

Turbo. A round Shell (q.v.) for stowage.

Turmeric. The root of a tropical country plant much used as a yellow colouring matter in some foodstuffs and as an important ingredient in curries.

It is usually shipped in bags of varying sizes and has a strong odour. When working it the dust arising often injures other goods, so they should be covered. Otherwise, Turmeric requires no special stowage.

Turpentine. See Oils, page 146.

Tutenague. An Indian name for crude zinc, also the name of a metallic compound brought from China called Chinese Copper Requires no special stowage.

Urea. A chemical product shipped in cases. See Chemicals page 113.

Urotropine. This is a Drug (q.v.) page 113.

Valonia. A kind of acorn which contains a large amount of tannic acid, and is therefore much used in the preparatîon of higher grade leather. Shipped usually in bulk, barrels and bags, it is liable to heat and should be well ventilated. It gives off a reddish yellow dust that may damage other cargo.

Vanadium Sulphide. An ore shipped from Peru. See Ores, page 148.

Vanelloes. An inferior kind of Vanilla bean (q.v.).

Vanilla. An extract obtained from the seed pods of a climbing orchid and used as a flavouring. The beans when cleaned and dried are packed in small boxes, and require careful stowage in a dry place.

Varnish. This is a solution of various resins in oil, and is usually carried in drums, but the finer qualities sometimes are in cans packed in cases. The more usual kinds shipped are oak and copal varnishes which are spirit varnishes having a low flash point, and should be stowed on deck. In any case it is preferable to stow varnish in some accessible place. See also Alcoholic compounds, page 194.

Vaseline. One of the products of petroleum—the more refined qualities are largely used for medicinal purposes—and is packed in tins or jars in cases and should be stowed according to packing but in a cool place.

Commercial vaseline is usually shipped in barrels weighing about 4 cwt., and requires ordinary cask stowage.

Veal. See Refrigerated Cargoes, page 153.

Vegetable Ivory. See Ivory Nuts.

Vegetable Wax. See Wax.

Vellum. A kind of fine parchment made from the skins of calves, now much used for bookbinding. It is usually packed in rolls in tin-lined cases and requires no special stowage.

Verdigris. This is a green mixture used as a pigment in dyeing and calico printing. It is poisonous and variously carried, usually in barrels; it should be carefully stowed away from edible goods.

Vermicelli. A foodstuff similar to macaroni and semolina, made from a hard wheat paste.

It is usually shipped in casks which should be stowed amongst dry goods, well away from any damp or highly scented articles, and being of a frail nature should be carefully stowed and handled.

The heat and moisture from green fruit will badly damage the quality of this article

Vinegar. A liquid obtained by fermentation of alcoholic liquors. It is packed in cases when bottled and requires ordinary stowage for bottled goods. Also in varying sized casks which should be given good cask stowage well away from articles which it may damage by taint if leakage occurs. See also Acetic Acid, page 107.

Vermilion. Obtained from cinnabar, also called red sulpide of mercury. Stowage as Cinnabar (q.v.).

Vulcanite (or Ebonite). A hard rubber used as a substitute for ivory, and in electrical installations. No special stowage required.

Walnuts. See Nuts.

Waste (Cotton). The refuse of manufactured threads of cotton. It is generally packed in bales and bundles, and care should be exercised to see that it is free from oily matter. Oily waste should not be stowed below as it is liable to spontaneous combustion, but should be kept in a cool place in a top deck if possible.

Waterproofed Clothing. See Oiled Clothing.

Waxes. A fatty substance of animal, vegetable, or mineral extract used for many purposes, the poorer grades being chiefly used for making candles. Beeswax, Carnauba, Japan, Refined Paraffin and Paraffin Scale are the usual kinds shipped.

Beeswax is the honeycomb of the hive bee of a yellow colour with a pleasant odour; much used in pharmacy and as a wood polish, etc. It is usually shipped in bags and occasionally in cases.

Carnauba Wax is the chief vegetable wax, of a dirty grey-green colour, used for making candles, floorpolishes, etc., and is usually packed in bags.

Japan Wax is a hard yellowish brown brittle substance and used as a substitute for beeswax. It is usually shipped in 1 cwt. cases.

Paraffin Wax is an important product of the petroleum industry, and is shipped in the refined condition, and in slack wooden drums, as "Scale" which is used as a poorer grade wax for making candles, etc.

"Refined" wax requires great care in stowage; it is used for manufacturing waxed paper in which to wrap articles of food, sweetmeats, etc., and is generally sold guaranteed "odourless and tasteless," and is rendered useless if at all tainted. It is packed in double bags, and must be stowed entirely apart from any article liable to taint it.

Wool Wax is a pale yellow peculiarly oily wax, and is the basis of the many "lanolines."

Spermaceti (q.v.) or Cetin is the solid wax obtained from the Sperm Whale, dolphin, shark and other fishes. It is carried in barrels and cases. Sperm Oil obtained from the blubber of the sperm whale is a liquid wax.

All waxes require stowage in a cool place to prevent them becoming heated, as not only would they run and damage other adjacent cargo, but in the case of the refined wax, which is in slabs, would cause much damage to it by their adhesion.

Waxes are generally inflammable. See also Oils, page 142.

Whale Oil. See Oil, page 145.

Wheat. See Grain, page 128.

Wheels, Wagon. See Railway Material.

Whisky. See Alcoholic Liquors, page 112.

Whitening. An article resembling chalk, but softer; used for many domestic purposes such as whitening ceilings, etc. It is sometimes shipped in bulk in small vessels, but usually in casks, kegs, or bags, and requires no special stowage. Care should be taken, however, that it does not damage articles stowed adjacent to it, as if dry much dust may come from it when handling.

White Lead. See Paints.

Wine. See Alcoholic Liquors, page 112.

Wire, Barbed. Usually packed on reels, weighing ½ to 1 cwt., this article should be kept clear of wet cargo and oils. The reels may be stowed anywhere, but are especially useful as good broken stowage between cases or beam fillings. If tarred, care should be taken that they do not come in contact with other articles they might damage.

Wire, Galvanised. This and bright wire are usually packed in coils in gunny, and should be kept quite dry and carefully stowed to avoid the coils getting crushed and misshapen.

Wire Netting. This is packed on rolls which may also be well utilised for upper broken stowage or beam fillings, but must have no weight on them.

Wire Rope. See Rope.

Witch Hazel. The leaves of a North American tree used in medicinal preparations. See Drugs, page 113.

Witherite. A very heavy mineral sometimes mistaken for lead ore on account of its weight; also called Barolite. Stowage as for Ores (q.v.) 148.

Woad. Yellow berries used as a Dyestuff (q.v.).

Wolfram. The mineral from which ore of tungsten is obtained. It is very heavy and used for hardening steel. Requires no special stowage.

Wood. See Timber, page 164.

Wood Oil. See Oil, page 143.

Wood Pulp. A material manufactured from wood and largely used in paper manufacture. The pulp is either made mechanically by forcing the wood against a wheel or by a chemical process.

Chemical wood pulp is pulp that has been treated with sulphite before shipment and is loaded in a perfectly dry condition.

Mechanical wood pulp contains about 50% of moisture and is always perforated. It is used only for cheap paper, usually as a mixture with the chemical pulp.

It is carried in bales of about 4 cwt. each in full cargoes, and requires no special stowage. With this commodity a deck cargo is usually carried.

Wool. This article, obtained from the sheep's hair, is largely carried, sometimes in full cargoes, in bales. These bales are usually "dumped"; that is, two bales are pressed together and bound round with bands to economise space. These bands should not be cut in stowage.

Wool is sometimes shipped "greasy," but often "scoured," and where possible it is advisable to separate the two kinds.

All bales require to be well dunnaged, matted and protected against contact with any ironwork of the vessel or adjacent cargo.

The great point, of course, in stowing wool is to see that no space is lost, and with this end in view the hold should be carefully measured to see which way the bales will stow to the best advantage, on their crown or their flat, or perhaps even some tiers each way, as by this method a large amount of space can be saved. Wool cargoes should be well ventilated.

Xylol (Xylene). Colourless oily liquids—derivates of benzene. Stow as Inflammable Liquids, q.v. page 194.

Xylonite. Another name for celluloid, of which the stands of gold and silver cups and handles of knives, etc., are usually made. Being an inflammable article, it should be stowed accordingly. Same conditions as Celluloid (q.v. page 188).

Yellow Berries. See Berries.

Yerba Maté. Paraguayan Tea (q.v.) for stowage.

Zedoary. The root of a plant used for perfumery and medicine, and also yields a turmeric. No special stowage required.

Zinc. A metal which is shipped in various ways as ingots, sheets, loose, packed or rolled, and nested in casks, etc. All these articles should be carefully protected from contact with water, and should be stowed according to nature of packing.

For Zincdust see Dangerous Cargoes, page 200.

Zincwhite. See Paints.

CHAPTER III

SPECIAL CARGOES

In this chapter are considered the following cargoes which, in our opinion, from one reason or another, are " special," and require more than a few lines of explanation.

The cargoes dealt with are :

- Acids
- Alcoholic Liquors
- Chemicals and Drugs
- Coal
- Cotton
- Deck Cargoes
- Fruit
- General Cargo
- Grain
- Heavy Weights
- Jute
- Livestock
- Oils
- Ores and Minerals
- Precious Cargo
- Refrigerated Cargo
- Rice
- Sugar
- Timber

Acids

To the popular mind the name " Acid " suggests something in which danger lurks and which must be treated with the utmost precaution

It by no means follows, however, that because a substance is labelled " Acid " it must necessarily be " dangerous." Many acids are perfectly harmless ; some, indeed, are foodstuffs.

Acids may be solid, liquid or gaseous, and in a technical sense are classified as Mineral Acids and Organic Acids.

To the Shipmaster this distinction is of little importance ; it is much more valuable information to him to know whether a particular acid is a dangerous cargo, in what way the acid is dangerous, and how it is advisable to carry it. From his point of view, then, Acids may be divided into three groups :

(a) **Corrosive Acids**—those which readily attack other substances, especially metal and timber, and therefore will cause considerable damage if leakage occurs.

(b) **Poisonous Acids**—those which are poisons in themselves or evolve poisonous fumes, contact with which is a danger to life.

(c) **Harmless Acids**—which require no special accommodation.

Generally speaking, all mineral acids are more or less corrosive, as are also very many of the organic acids. Such acids should never be actually handled, and it may be well to note that some solid acids readily attack the skin. **Solid Acids** would usually be packed in drums or cases, more often well waxed, and must be kept dry. The containers should be carefully inspected, for if water reaches the acid and the container is in any way faulty, leakage and damage must ensue. **Liquid Acids** would generally be shipped in carboys. These carboys should be surrounded with some antacid material, e.g. chalk, and securely packed in an iron crate. Such cargo should be carried on deck "At Shipper's Risk," and provided the containers are efficiently lashed there need be little cause for anxiety. If, however, accident should happen, the defective articles should be thrown overboard. See also Deck Cargoes, page 116.

Gaseous Acids would be contained in cylinders. These cylinders should be wrapped in rope and then stowed in the coolest part of the vessel. Gas cylinders must always be tightly wedged to prevent movement during transit, for collision between themselves, or between them and the parts of the vessel, may cause the container to burst, especially so if the temperature has changed considerably, as in the tropics. See Cylinders, page 30.

Acids in small quantities will in general be shipped as Chemicals (q.v. page 113), and the responsibility for the efficient packing and the special directions for stowage lies with the manufacturers.

There is no doubt that very many of the serious consequences resulting from an accident to an acid container might be minimised if one knew precisely what to do in the event of emergency. The simple expedient of dumping the affected article overboard certainly removes the cause, but the effect remains in the ship, and it is to the remedying of the mischief done that the suggestions more particularly apply.

Wherever corrosive acids are concerned, spilt liquor may with reasonable safety be soaked up by ashes, or better, sand, if such be available. Obnoxious fumes may be evolved and precaution is therefore necessary. The affected part should then be mopped with strong soda water and finally with clean water. **The use of the hands in direct contact with these acids must be avoided.**

Many of the acids have been considered as "Dangerous Cargoes" (v.seq. Chapter IV), especially in those cases where specific regulations are in force for their transport.

The repetition in this section may, however, be justified by the suggested action to be taken in case of emergency.

To facilitate reference the acids are here given in alphabetical order. It must not be supposed that this list in any way enumerates all the acids. Only those are included which are of sufficient importance in the commercial world to warrant their shipment in quantity.

Acetic. Pure Acetic Acid is a colourless liquid with penetrating odour and is strongly corrosive.

This liquid crystallises, thus forming **Glacial Acetic Acid.** Both forms readily blister the skin.

The acid is largely used in dyeing, calico printing, and medicine. A diluted form, coloured and flavoured, is known as **Vinegar.** Liquid Acetic Acid should be shipped in well protected carboys.

Glacial Acetic Acid must be contained in strong earthenware jars. With increase in temperature the crystals will melt in their own water of crystallisation.

Both forms are "**Dangerous.**"

Vinegar is shipped in barrels which must be carefully inspected, for a leakage would quickly corrode any metal in the neighbourhood.

In the event of accident, well wash the affected parts with strong soda water.

Arsenic. Arsenic Acid forms transparent crystals which slowly dissolve in atmospheric moisture, producing a thick syrupy liquid. The acid should be contained in strong hermetically sealed jars and packed in a case with sawdust.

It is a **dangerous poison.** The acid is not corrosive unless in liquid form, when it will readily attack iron. It must not be packed in iron drums.

Arsenious. This name is usually applied to the Oxide of Arsenic called **White Arsenic,** a substance in great demand in many varied industries. White Arsenic is a colourless mass without smell. **It is a deadly poison.** The Oxide should be packed in strong drums or kegs. The solid acids are not corrosive and are easily disposed of in an emergency. The area must be well washed subsequently as advised.

Benzoic. This acid is used in pharmacy and in the preparation of blue dyes for calico printing.

The acid is a solid in the form of colourless thin plates. Packed in drums or kegs, this article may be stowed anywhere, as the acid is perfectly harmless.

Boric. Also known as Boracic Acid. Boric Acid is largely used as a preservative and in pharmacy.

It is a solid acid in the form of shining colourless scales which may be carried with perfect safety anywhere. The substance should be packed in strong kegs and is quite harmless.

Carbolic. The substance known by this name is chemically not an acid at all, and has been popularised as an "acid" on account of its highly corrosive action analogous to that of a true acid. Known more correctly as **Phenol,** carbolic acid occurs in the form of pinkish crystals which readily liquefy. **The liquid burns the skin and is a deadly poison.** Phenol forms the prime constituent of very many disinfectants.

In the event of leakage, well wash with plenty of water.

A weak solution of carbolic acid has highly antiseptic properties.

Carbonic. A heavy colourless and odourless gas which would be carried in cylinders. The gas is of a suffocating nature and would settle in the bottom of a hold. It may be detected by lowering a lighted candle, which would be extinguished if the gas were present. **Thorough ventilation by strong draught is most essential if the presence of the gas is suspected.**

Carbonic Acid Gas is contained under high pressure in automatic fire extinguishers, and hence this "Dangerous" cargo might be of inestimable value in the case of fire. Releasing the gas in the neighbourhood of the conflagration will effectually extinguish it.

Chloracetic. There are three forms, two of which are liquid and the third a solid, and should be considered in the same way as the corresponding Acetic Acid, remembering that on account of the presence of chlorine the chloracetic acids are more corrosive than acetic.

Chromic. Shipped as scarlet crystals of oxide in hermetically sealed drums, the substance should cause no anxiety. The oxide readily becomes liquid in the presence of moisture.

Chromic Acid, though harmless in itself, would vigorously "feed the flames" with its oxygen in the neighbourhood of a fire.

Citric. Largely used for domestic purposes, etc., this acid must be considered as a foodstuff. A white crystalline solid shipped in stout kegs and barrels, and may be stowed as "food."

Formic. This acid is a colourless liquid which fumes in the air. **It has a most pungent odour and is corrosive, blistering the skin.** It is very unlikely that the acid would be shipped in large quantity, and would therefore be treated as "Chemicals." The sting of the nettle is due to this acid, and the remedy, washing soda, is an effective antacid.

A derivative of Formic acid called **Formaldehyde** or **Formalin** would, however, be shipped in much larger quantities. This substance, which is a gas in the pure condition, is only used commercially as a 40 % solution in water. The solution and vapour have a pungent odour and powerful disinfectant properties, and are largely used as such, as a food preservative, and in sundry other commercial purposes.

The containers should be kept as cool as possible and no other rigid precautions are necessary.

Gallic. A colourless crystalline acid with a bitter taste obtained from the " galls " of plants and much used in photography. Shipped in stout kegs it forms a harmless article.

Hydrochloric. Also known as **Muriatic Acid** and **Spirits of Salt. A highly corrosive acid which evolves pungent suffocating fumes.** Must be carried as Deck Cargo and contained in carboys securely packed in iron crates. The acid readily attacks metals, and in the event of breakage would quickly damage ironwork of the ship. Further, this action would cause the evolution of Hydrogen, an inflammable gas which forms an explosive mixture with air. Immediate counteraction of the acid effects by ashes and soda is necessary, and thorough washing subsequently.

The acid is also a poison. **A " Dangerous " cargo. Don't stow Hydrochloric Acid and Ammonia in the same neighbourhood, for the two vapours readily combine.**

Hydrocyanic. More commonly known as **Prussic Acid**—a virulent poison. A colourless liquid having a penetrating acrid smell suggestive of bitter almonds.

The extreme danger associated with the transport of the acid renders the shipment of a large quantity most unlikely. The acid is more conveniently carried in the form of salts, particularly as **Potassium Cyanide,** and the red and yellow prussiate of iron.

All cyanides are most poisonous, and must be packed in hermetically sealed drums and stowed well away from all foodstuffs and living quarters. Potassium Cyanide evolves the poisonous cyanogen even when mixed into a paste with plaster-of-paris. In the case of accident, isolate the area until thorough ventilation has removed all trace of gas, and even then proceed with caution. Use the fire-hose liberally and thoroughly wash.

Hydrofluoric. A highly corrosive acid, fuming strongly in the air, causing blisters and sores on the skin, and if inhaled is extremely poisonous. **This acid readily attacks almost everything, even glass,** and can only be transported in containers of lead or rubber or in a vessel perfectly lined with paraffin wax. **A most dangerous cargo** and carried on deck. In emergency dispose of the container, and use strong soda water abundantly to neutralise acid effects.

Hydrosulphuric. A gas with a most objectionable odour. It is unlikely that the acid would be shipped except as a solution, which on account of its odour must be well isolated. A defective container would be immediately detected by the smell and should be at once discarded. Where leakage has occurred, thorough ventilation is essential. The resulting liquid would be, in the main, water. Wash out with soda water

Lactic. This acid, familiar as the acid of sour milk, is commercially important on account of its extensive use in the dyeing and tanning industries. The acid would be shipped in barrels and would require no special treatment as it is of a harmless nature.

Nitric. Also known as **Aqua Fortis. A highly corrosive acid which fumes in the air** and attacks the skin. The carboys containing this acid should be securely packed in earth in iron crates and carried as Deck Cargo. The acid attacks metals readily and also wood, and hence in the event of leakage ashes and water must be freely used to minimise the effect on the deck of the ship. Strong soda is an effective antacid.

Oleic. Commercially known as **Olein**. This acid is now shipped in considerable quantity for use in soap manufacture. The substance is contained in barrels as an oily liquid and beyond leakage is unlikely to cause trouble. An otherwise harmless cargo, olein if exposed to air soon becomes rancid, and acquires a distinctly unpleasant smell. Hence, the containers should be frequently examined, especially where there is a great range of temperature, and any leakage immediately cleared away. Formerly the vegetable product from which the acid is obtained was exported, but now the olein is produced at the source.

Oxalic. Odourless crystals of a highly poisonous nature. Contained in strong earthenware jars and safely packed in cases, the cargo can be carried without anxiety. Breakage may be easily swept up and stowage, of course, would be well away from foodstuffs.

Palmitic. Commercially called **Palmitin,** is exactly comparable with Oleic Acid, except that this acid during shipment may be solid in cooler temperatures. Shipped as an oil at the source of production, Palmatin would solidify by the time it reached Europe.

Phenol. Carbolic Acid (q.v.).

Phosphoric. The acids of Phosphorus are of a very slight corrosive nature, and in efficient packing may be carried without undue anxiety. In stowage, it must be remembered that the acids are poisons. Phosphoric acid is a syrupy liquid shipped in carboys.

Picric. Pale yellow crystals largely used in the preparation of explosives. The acid is poisonous.

When mixed with not less than 50 % water the substance may be carried with perfect safety.

The special regulations for the carriage of this acid are given on page 196.

Propionic. A colourless very acid liquid with a strong smell of vinegar. In dealing with this acid the treatment should be exactly analogous to that for Acetic Acid.

Prussic. Hydrocyanic (q.v.).

Pyrogallic. More correctly termed **Pyrogallol,** forms white shining poisonous crystals much used in photography, electro-plating, etc. The acid must be stowed dry and apart from alkalis. It is packed in sound kegs and cases, and should cause no difficulty in transport.

Salicylic. The acid forms colourless crystals, although the commercial product may be yellowish white. It is used as a preservative, in medicine, and in dye works. Packed in sound kegs or drums the commodity may be carried with safety anywhere in a dry place.

Stearic. Commercially known as **Stearin,** this acid, like Olein and Palmatin, is largely used in soap and candle manufacture, and is now produced at the origin of the vegetable fats. It is also a product of the great American slaughter-houses.

Stearin is carried in barrels and is a solid, which requires no special stowage,

Succinic. This acid, which is used in medicine and in the preparation of coal-tar products, is a colourless crystalline solid requiring no special treatment for transport if packed in sound kegs or drums. A harmless cargo requiring only stowage in a dry place.

Sulphuric. Also known as **Oil of Vitriol.**

A heavy oily **highly corrosive liquid** which must be carried in carboys packed in chalk in crates and stowed as Deck Cargo.

Sulphuric Acid combines with water with the evolution of very great heat. For this reason **water must never be put on a large volume of acid as the heat is sufficient to cause the water to boil and "spit" acid in all directions.**

Further, this acid readily attacks wood, and sawdust in the neighbourhood may easily be fired. Absorb leakage with ashes, and then wash with a large quantity of soda water, and finally with clean water. The acid burns the skin. In the event of burns by sulphuric acid never put water on the affected part ; use oil—carron oil for preference—or fat free from moisture.

A "Dangerous" article.

Nordhausen Sulphuric Acid is Sulphuric Acid of a stronger nature and gives off fumes.

Sulphurous. This acid is far less dangerous than Sulphuric Acid, being a solution in water of Sulphur Dioxide. The liquid has the familiar odour of burning sulphur, and gives off fumes which have bleaching properties in the presence of moisture.

The carboy containing the acid should be carried as Deck Cargo and kept as cool as possible. The chief danger lies in the fumes, and in the case of accident give thorough ventilation and water may be used freely.

Liquefied Sulphur Dioxide would be carried in steel cylinders which must be stowed in a cool place, and precaution taken that the cylinders receive no shock.

Tannic. Perhaps more commonly called **Tannin,** the acid comes into the market as a yellow powder for use in the leather and dyeing industries. Shipped in stout barrels and kegs, and stowed in a dry place, there is no danger whatever in its transport. A harmless cargo.

Tartaric. Colourless, odourless crystals which may be considered a foodstuff and shipped as such The substance would be packed in barrels or kegs, and requires to be stowed in a dry place.

As previously stated, the foregoing list by no means includes all acids. In accepting as cargo an acid not enumerated, it is essential that correct denomination and particulars of the substance be obtained. Acids in the form of solids should always have stowage in a cool dry place. It is wiser to err on the side of safety than to take risks

ALCOHOLIC LIQUORS

For the purposes of this work, under this heading are included ale, beer, brandy, spirits, liqueurs, wines, beverages, etc

Alcoholic liquors are shipped in various containers such as barrels, hogsheads, pipes, etc., and also many are shipped in bottles in cases. The stowage of these liquors depends entirely on the method of packing.

When shipped in barrels all such liquids require exceptionally good barrel stowage. The barrels should be carefully examined when received, and a note made of any that appear to be in the slightest way defective, or show any signs of having been spiled.

It is often customary in vessels passing through the tropics after barrels of beer are stowed to insert a small porous plug through the bung. This is done in order to prevent the casks bursting when the beer is " up." When this practice is adopted allowance must be made—as regards any cargo that may be stowed underneath the barrels—for any liquid that may ooze out.

Alcoholic liquors should not be stowed in a warm place, as heat or moisture may damage them; as may also tar, asafœtida, sandalwood, essential oils and other highly scented articles, especially in the case of beer. Oil or grease in casks should never be stowed over barrels of ale or beer.

A considerable quantity of beer is now shipped in bottles in cases. These only require ordinary stowage for case goods, but they should not be stowed amongst articles liable to be damaged in event of the bottles bursting, as this frequently occurs.

Wine and spirit in bottles require ordinary case stowage, but special precautions must be taken in their handling.

When loading or discharging any alcoholic liquors they should never be left unwatched. Even after a consignment of such articles are stowed in the hold, it is not sufficient to allow a small quantity of cargo to overstow them, as it will often be found that serious ullage or pilferage has occurred when it is discharged.

A plan often followed that can be recommended is, where possible, to allot " lock up " stowage to alcoholic liquors

The stowage of Alcohol is treated under Inflammable Liquids (q.v. page 194).

CHEMICALS AND DRUGS

By the term " Chemicals " are understood those substances which are the result of chemical action, and produced by the agency of the manufacturing chemist.

Drugs are chemicals, but are specifically designated on account of their use in pharmacy. The same substance may be a Drug in the hands of a doctor and a Chemical when in use in the arts and manufactures. Formerly, such substances were called drugs as had a vegetable origin, but the distinction no longer serves.

From the point of view of cargo, Chemicals and Drugs may be considered as pure products of chemical manufacture which are shipped in small quantities, to be used particularly in medicine. Where the chemical is produced in large quantities for use on a large scale it will be shipped under its own name. Very often such a commodity is known by a popular name, for example Saltpetre ; but as a chemical such substance would be given its correct name, viz. : Potassium Nitrate. Further, when used in medicine, Chemicals and Drugs are known by Latin names assigned to them by the British Pharmacopœia. However, from the shipping aspect such niceties of distinction are of little importance.

Chemicals and Drugs will be packed in cases by the manufacturers ready for transport, and so far as the ship is concerned is but a case of Chemicals. Whenever special attention is required for stowage, instructions must be given by the manufacturers and plainly marked on the case. The contents of the case will remain a mystery, but it may not be out of place to suggest a few precautions which should be taken when Chemicals form part of a general cargo.

Remembering that the description " Chemicals and Drugs " includes all those substances of chemical manufacture which have been enumerated under the various sections of Dangerous Cargo, and very many more of a more or less harmless nature, it is advisable to view with suspicion a consignment so labelled.

The onus of providing efficient packing and details of stowage lies with the consignor, and the instructions should be, as far as is practicable, adhered to.

Generally speaking, cases of Chemicals should be stowed :—

(1) **Away from boilers in a cool place.**
(2) **Not in the same compartment as foodstuffs.**
(3) **Not in close proximity to specified " Dangerous " Cargo.**
(4) **Near the hatch in order to be easily accessible.**

The cases will frequently contain breakables, and should at all times be handled with great care. A dropped case may reveal no damage at the time on the surface, but may be the cause of very great damage to the contents.

To enumerate the Chemicals and Drugs would be neither possible nor of any utility, the cargo being considered as a case. Provided that the manufacturers, in their own interests, pack their case in an efficient manner and afford the ship all information, there should be no difficulty whatever in dealing with the cargo.

COAL

Coal is usually carried in bulk as a full cargo, and therefore requires no special stowage except that it must be properly trimmed.

At the same time, the carriage of a cargo of coal requires special attention. Before loading, the bilges should be examined to see that the rose boxes are all clear, and that all limber boards are properly fitted so that the small coal will not get into the bilge and possibly choke the pumps.

When commencing to load, it is advisable, if at all practicable, to lower the first wagon or two as far down into the hold as possible before tipping, not only to avoid damage to tank top, tunnel, rungs of hold ladders, etc., but to prevent breakage of coal, as this not only depreciates its value, but it is considered that coal is more liable to spontaneous combustion after being recently broken. Hence one of the reasons why fires and explosions so often occur at the beginning of a voyage.

It is usually best to run as much coal as possible in the centre hatches, and then, whilst this is being properly trimmed, to run a certain amount in the end hatches ; then complete the centre hatches, and afterwards trim the vessel to her load line by the end hatches.

Coal requires special care as regards ventilation, it being very liable to spontaneous combustion. **Surface ventilation is absolutely necessary and must be given at all times,** and in addition to the ordinary fixed hold ventilators, hatches should be opened if possible in fine weather, at any rate during the early part of the voyage.

Thermometers should be used at frequent intervals, and careful note made of any increase of temperature above the normal increase or decrease of the atmosphere.

It is quite a common thing to see steamers with all their cowls unshipped and ventilators battened down when sailing with a cargo of coal. This is a pernicious practice that cannot be too strongly condemned, and has in our opinion been the cause of many of the numerous losses which have occurred with coal-laden ships in recent years.

As the end hatches as a rule are not full it is advisable that some means should be taken to prevent the cargo therein from shifting. While there is no actual regulation compelling the use of shifting boards, we think, however, that some such precaution might be taken, if only to erect them on the top of the coal after it has been levelled down.

Coal taken on board during wet weather will sometimes turn out as much as 3 % short.

COTTON

Cotton is carried in large quantities in full cargoes, part cargoes, and as small consignments from the following countries—America, Australia, Brazil, Egypt, Turkey and Greece, West and East Indies, Peru, etc.

We do not propose to enter into detail regarding the old method of screwing cotton into a vessel, as this is very seldom resorted to in the present day. Owing to the large cubic capacity vessels, and to the fact that the bales are now hydraulically pressed, the extra expense, and loss of time incurred by the older method would not be commensurate with the additional freight earned.

Certainly, owing to the scarcity of tonnage, this method was somewhat resuscitated during the Great War, but it is again falling into disuse. In all cases bales of cotton require to be carefully stowed, and the hold measured before and during the operation in order to ascertain how many heights will fit in, so that arrangements can be made to stow the bales on their flat, edge, or end so as to ensure the hold being completely filled.

As this cargo is very inflammable, it is most important to take every precaution to prevent fire. Where possible bales should be examined before being received on board, and should they show signs of having been wet they should be refused, as this may cause spontaneous combustion.

Adequate dunnage and mats should be used, and all iron in the compartment to be used for cotton should be well covered with burlap or mats. Care should be taken to stow bales of cotton well away from any oily or greasy goods, and if the hold has been recently painted it must be ascertained that this is thoroughly dry before taking any of the bales on board.

During loading all precautions must be taken against fire, hoses should be ready, **" No Smoking "** notices exhibited, and all galley funnels should be gauze covered to prevent sparks reaching the cargo.

During the passage it is advisable also to have all ventilators covered with wire gauze, as a carelessly-thrown match, or even a spark getting down a ventilator, may cause a serious fire.

The Board of Underwriters of New York, with which is incorporated the National Board of Marine Underwriters, have special rules relative to the stowage of Cotton with various other commodities.

DECK CARGOES

Under this heading we include all goods that are carried on the open decks of a vessel, and have no reference to covered-in deck spaces such as bridges, poops, etc., or to tonnage openings.

Deck Cargoes may be mentioned under three headings:

(1) Those that are carried on deck because they are "dangerous."

(2) Those that are of necessity carried on deck because, owing to their size or shape, they cannot be stowed underdeck.

(3) Those that are carried on deck because the vessel is full underdeck but not down to her loadline.

(1) This includes such articles as acids and other liquids which would damage the vessel and cargo if they leaked when stowed below; or articles which are highly inflammable, such as celluloid scrap, some varnishes, etc.

The stowage of these naturally depends entirely on the packing. Such packages as carboys should be stowed in a good sheltered position where they will not be subject to the force of the sea, and they should be well bedded and properly lashed. It is always advisable to lash carboys (if containing a corrosive acid), with wire, as a rope lashing may be burned if any leakage occurs.

Heavy iron drums containing liquids which must be stowed on deck should be carefully stood on end on planks. If only a small number of these drums are carried, it is a good plan to nest them around the mast or stow them in a corner of the deck, well secured with long planks round which substantial wire or chain lashings should be placed.

Another method of stowing a few drums like this is to stand them along inside the bulwarks on their ends on planks, place a long plank or small spar alongside them, and pass lashings from this spar between the drums to the bulwark stanchions.

Light goods, such as cases of the celluloid scrap mentioned above or similar articles, are better stowed on the hatches, to avoid their being broken and smashed by any heavy seas that may come on board. Care should be taken that boards are placed between the cases and the hatch tarpaulins, and the cases should be securely lashed across the hatch. It is advisable to lash them with manilla rope, as this can be more easily hove taut, and in event of bad weather and the ropes becoming wet they naturally shrink and remain especially taut. After bad weather lashings of any deck cargo should in all cases be examined, and tightened up if necessary.

(2) With regard to articles carried on deck in consequence of their size or shape, it is impossible to lay down any general rules with reference to the stowage, as of course it depends entirely upon these features as to how stowage must be effected. Suffice it to say that although these goods are usually taken at "shipper's risk," it is nevertheless specially necessary to see that they

are properly stowed and secured, for if such cargo breaks adrift during a voyage it usually means that not only is the cargo itself damaged, but the vessel and the crew may possibly suffer serious injury.

It is of great importance when stowing heavy weights on deck to take into consideration on what portion of the deck the weight from this cargo will bear, and to see that the deck or beams underneath the cargo are sufficiently strong to bear the weight.

A point that must be considered with regard to long spars carried on deck because of their length, is, that it is not sufficient to see that they are properly lashed with athwartship lashings either to the hatches or to the bulwarks ; but they must be well lashed " down," otherwise, should the deck become flooded, they will float and possibly loosen the lashings, which would eventually carry away if the spars once started to move.

Such things as launches or other bulky articles are most difficult to stow and secure. In the case of launches or boats, not less than three proper beds should be constructed (or more if it be a long launch) to take the weight. These should be well secured on baulks of timber laid across the deck, and care should be taken that they do not rest between the beams of the vessel, but on the top of a beam. The launches should be lashed over all—having first had timber laid on their decks to take the lashings, with chafing-pieces on the gunwale or anywhere where the lashing is likely to touch the launch.

It is necessary to see that sufficient good fastenings are provided to which the lashings may be secured. One often sees in such cases many turns of wire or chain taken round a piece of deck cargo and secured to a small ringbolt, which in its turn is perhaps lightly riveted to a hatch coaming or on deck. If the required number of good fastenings are not available it is always advisable to fit special ringbolts into the ship's side, and at or about the hatch coamings. This is very little trouble, as ringbolts can always be bolted on with heavy bolts and are easily removed.

When lashing a deck cargo, such as those above mentioned, consideration must be given to the side force exercised by a sea striking the vessel during heavy weather, and one must imagine the vessel heeled over to a considerable angle and tons of force being applied to the side of the cargo. The average landsman has not the slightest idea of the tremendous force exercised by a sea when striking a vessel's deck in bad weather.

To compensate for this force, if the piece of deck cargo cannot be placed well in clear of the rail it must be tommed or shored from inside, such as from the hatch coaming, mast, or other part of the ship.

As we have said before, all such articles of deck cargo must be carried as circumstances permit ; and we may here remark that they are usually carried at " shipper's risk."

(3) This sub-division covers cargoes such as timber, etc., carried on deck for want of space underdeck.

There are many points to consider about a cargo of this nature. In all cases it is incumbent upon the persons concerned to see that the stability of the vessel is sufficient on sailing, and to make allowance to cover the subsequent use of fuel and water on the passage.

A deckload of timber is by far the most important of all deck cargoes, and requires the **greatest consideration as regards stability.** We are therefore dealing with timber deckloads at some length.

It is most essential to get good stowage at the bottom of the ship, and also the heavier class of timber available according to the cargo to be shipped, such as in a Pacific cargo, for instance Hemlock. Therefore, when loading, to give satisfactory carrying results, an endeavour must be made to get all the heavy lumber first.

In dealing with the stability of a vessel being loaded with a deck cargo of timber there are several factors which have to be considered, such as the style and build of the vessel and the requirements of fuel and water for the voyage.

To deal with the stability for coal or oil burners requires more than a little consideration. At first glance it would appear that a coal burner is better than an oil burner, but this is not so. It is thought that when burning coal, since you are using the top weight from maybe the side bunkers, or side casings or the top part of the cross bunkers, that you are improving the stability, but it is overlooked that all the time the vessel is rising in the water and your deck load is consequently higher, and if you have a long passage of, say, 30 days, consuming 30 tons per day, you are 900 tons lighter at the end of the passage, or say the vessel has lightened perhaps 2 feet. This would be a very serious item and one which must be taken into consideration when loading, and a sacrifice of deck cargo must be made.

With an oil burner it is different. True, you are burning weight from the bottom, but when one tank is empty you can fill it with water so that it is only necessary to make allowance when loading for the weight of one tank of say 200-300 tons. This of course is if the tanks are longitudinally divided. If forced to work with big tanks of say 500-600 tons capacity it would be fatal to have a 600 ton undivided tank partly empty near the termination of a passage should bad weather be encountered.

When loading a heavy cargo, such as timber, on deck it is important to see that all tween deck stanchions are in their places, as in order to secure good underdeck stowage it is frequently found necessary to remove such stanchions. In this case the beams should be wedged up solidly from the timber in the tween decks.

Before loading any deck cargo, arrangements must be made for access to be had to sounding pipes where necessary, also to see that steering rods and stanchions carrying them are adequately protected. It is also necessary to see that provision is made for securing a deckload before loading commences.

There are many ways of securing deck cargoes ; but quite a good method to secure a light cargo—for example fibre—is to take a mooring wire and secure the end at one end of the bulwark or rail, pass it along underneath the bulwark stays or rail stanchions as the case may be, and allow bights to hang over the rail. Do this on both sides. These bights should be of sufficient length to reach well in on top of the load, and when the deck cargo is on board they may be brought up opposite to one another and lashed together.

Attention must be paid to leaving sufficient of the winches clear, and available for use in working the vessel during the voyage and at intermediate bunkering ports.

Before loading timber on an iron deck it should be dunnaged to prevent the lower tiers being damaged by contact with iron or dirt or by the oil from winches, etc. It is advisable to use ordinary rough boards for this purpose, and these should not be too narrow, otherwise with the weight of the deckload the lower tier of cargo may possibly be marked. This dunnage wood should be laid diagonally and the planks kept fairly close together. By placing these boards diagonally the pressure on the beams is distributed.

Sufficient stanchions must be placed inside the rail or bulwarks of say 6″ × 4″ or 6″ × 6″ if available. They should be placed about 6 to 9 feet apart, inclined slightly inwards, and should be about 4 feet higher than the height of the anticipated deckload. The upper ends will serve as stanchions for a temporary rail.

When taking short timber on deck it is advisable to use some of the longer lengths for the outside tier around the rail to prevent risk of loss.

All timber cargoes should be secured by chain lashings, and where vessels are regularly employed on this trade it is better to have chains affixed to the vessel's side by a ringbolt, and secured on top of the cargoes by a bottle screw fitted with a hook to catch the chain at the required link.

All timber cargoes require to be carefully wedged off to prevent shifting.

A great number of timber cargoes are carried on deck, and their carriage is regulated by rules laid down in the Merchant Shipping Act (v. seq.).

Regulations as to Deckloads of Timber

Section 10 of the Merchant Shipping Act, 1906, relating to the loading of timber, came into force 21st December, 1906, when Section 451 of the Merchant Shipping Act, 1894, was repealed. Section 10 is as follows :—

10.—(1) If a ship, British or foreign, arrives between the last day of October and the sixteenth day of April in any year at any port in the United Kingdom from any port out of the United Kingdom, carrying any heavy or light wood goods as deck cargo (except under the conditions allowed by this section), the master of the ship, and also the owner, if he is privy to the offence, shall be liable to a fine not exceeding five pounds for every hundred and fifty cubic feet of space in which wood goods are carried in contravention of this section.

(2) The conditions under which heavy wood goods may be carried as deck cargo are as follows :—(*a*) that they must only be carried in covered spaces ; and (*b*) that they must be carried only in such class of ships as may be approved by the Board of Trade for the purpose ; and (*c*) that they must be loaded in accordance with regulations made by the Board of Trade with respect to the loading thereof.

(3) The conditions under which light wood goods may be carried as deck cargo are as follows :—(*a*) Each unit of the goods must be of a cubic capacity not greater than fifteen cubic feet ; and (*b*) The height above the deck to which the goods are carried must not exceed—

(i) in the case of an uncovered space on a deck forming the top of a break, poop, or other permanent closed-in space on the upper deck, three feet above the top of that closed-in space ; and

(ii) in the case of an uncovered space not being a space forming the top of any permanent closed-in space on the upper deck or a space forming the top of a covered space, the height of the main rail, bulwark, or plating, or one-fourth of the inside breadth of the ship, or seven feet, whichever height is the least ; and

(iii) in the case of a covered space the full height of that space, and regulations may be made by the Board of Trade for the protection of seamen from any risk arising from the carriage of the goods in any uncovered space to the height allowed under this section, and those regulations must be complied with on the ship.

(4) Provided that a master or owner shall not be liable to any fine under this section—(*a*) in respect of any wood goods which the master has considered it necessary to place or keep on deck during the voyage on account of the springing of any leak, or of any other damage to the ship received or apprehended ; or (*b*) if he proves that the ship sailed from the port at which the wood goods were loaded as deck cargo at such time before the last day of October as allowed a sufficient interval according to the ordinary duration of the voyage for the ship to arrive before that day at the said port in the United Kingdom, but was prevented from so arriving by stress of weather or circumstances beyond his control ; or (*c*) if he proves that the ship sailed from the port at which the wood goods were loaded as deck cargo at such time before the sixteenth day of April as allowed a reasonable interval according to the ordinary duration of the voyage for the ship to arrive after that day at the said port in the United Kingdom, and by reason of an exceptionally favourable voyage arrived before that day.

(5) For the purposes of this section—(*a*) the expression " heavy wood goods " means—

(i) any square, round, waney, or other timber, or any pitch pine, mahogany, oak, teak, or other heavy wood goods whatever ; or

(ii) any more than five spare spars or store spars, whether or not made, dressed, and finally prepared for use ; and

(*b*) the expression " light wood goods " means any deals, battens, or other light wood goods of any description ; and (*c*) the expression " deck cargo " means any cargo carried either in any uncovered space upon deck or in any covered space not included in the cubical contents forming the ship's registered tonnage ; and (*d*) the space in which wood goods are carried shall be deemed to be the space limited by the superficial area occupied by the goods, and by straight lines enclosing a rectangular space sufficient to include the goods.

(6) Nothing in this section shall affect any ship not bound to a port in the United Kingdom which comes into any port of the United Kingdom

under stress of weather, or for repairs, or for any purpose other than the delivery of her cargo.

The following Rules under the above Section 10 of the Merchant Shipping Act, 1906, were made by the Board of Trade, 7th February, 1907, and came into force from that date :—

RULE I.—Classes of Ships approved for the purpose of carrying Heavy Wood Goods as Deck Cargo.

The classes of ships which are approved for the purpose of carrying heavy wood goods as deck cargo are iron or steel steamships having covered spaces, that is to say, poops, bridges, forecastles or shelter decks, which form part of the permanent structure of the ship, and which comply with the following conditions :—(*a*) The space must be within an erection which extends from side to side of the ship. (*b*) The outside plating must be continuous from deck to deck and throughout the full length of the space. (*c*) The length must be bounded by iron or steel partitions, and the total area of the openings in any such partition must not exceed one-fourth of the area of the partition itself.

RULE II.—Regulations with respect to the Loading of Heavy Wood Goods as Deck Cargo.

1. Heavy wood goods may only be loaded in covered spaces which form part of the permanent structure of the ship, and which comply with the conditions specified in the preceding Rule I.

2. Heavy wood goods must not be loaded in any covered space in such a manner as to make the ship unfit, by reason of instability, to proceed to sea and to perform the voyage safely, having regard to the nature of the service for which she is intended.

3. Heavy wood goods must be properly stowed and secured so as to prevent shifting.

RULE III.—Regulations for the Protection of Seamen from risk arising from the Carriage of Wood Goods as Deck Cargo in Uncovered Spaces on board Ship.

1. When wood goods are carried in an uncovered space there shall be fitted on each side of the ship temporary rails or bulwarks of a substantial character for the full length within which the deck cargo is stowed, extending to a height of not less than 4 feet above the line of the top of the deck cargo.

2. The uprights of such temporary rail or bulwark shall be of substantial scantling and be placed not more than 4 feet apart ; the heels of the uprights shall extend down to, and rest on, the deck of the vessel.

3. There shall be attached longitudinally to these uprights for the full length of the deck cargo, spars, deals, battens, guard-ropes or chains at intervals of not more than 12 inches apart in a vertical direction. If ropes or chains are used, they shall be set up taut and securely attached to each upright.

4. The temporary rails or bulwarks may consist of closely spaced vertical deals, provided they are properly secured and that there are protected openings at intervals for water clearance.

5. Where light wood is carried in an uncovered space (not being a space forming the top of any permanent closed-in space on the upper deck or a space forming the top of a covered space) and the uncovered space is bounded by an open rail formed of wood, iron, or steel stanchions and longitudinal rods, battens or chains, no measures for the protection of the seamen shall be deemed sufficient if the height of such rail exceeds 3 feet 6 inches.

FRUIT.

Fruit is carried in three different conditions, either as fresh or green fruit, as tinned, bottled or preserved fruit, or lastly, as dried fruit.

In the case of fruit carried "green," this trade has increased enormously in the past few years. Much fresh fruit is now carried in ships in cold storage and the method is described on page 155, but there is still a large quantity of fruit such as oranges, lemons, apples, etc., carried in uninsulated vessels, of which many are specially built for the trade.

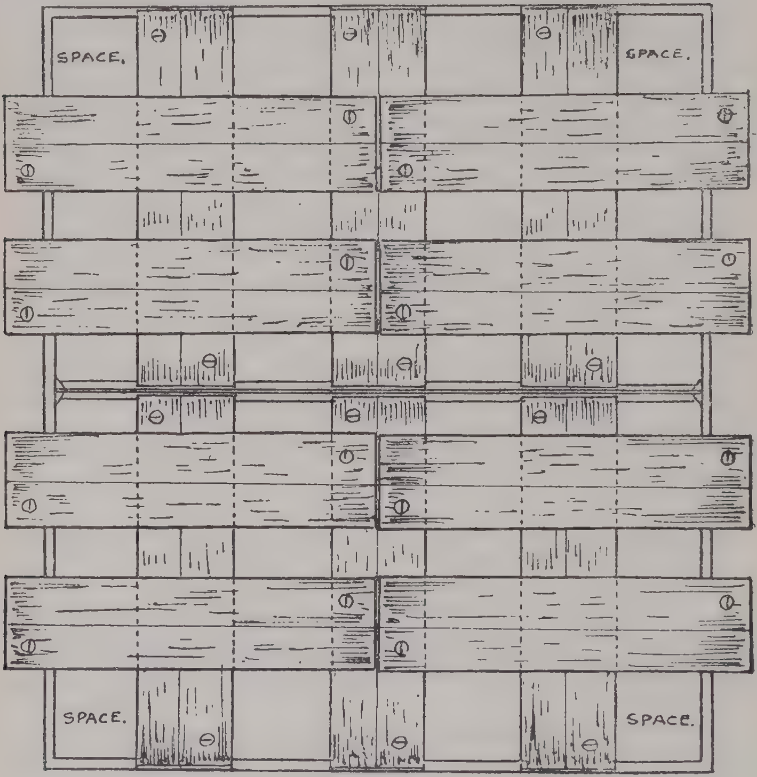


FIG. 18

FRUIT.—TWEEN DECK HATCHES LAID "GRATING FASHION"

The most important thing to consider as regards the carriage of fruit is **ventilation**; as, no matter in what condition fruit is shipped, if it is not ventilated, decomposition will soon set in and it will be quickly ruined. If on a long voyage, special precautions must be taken—air shafts left in the cargo—and additional ventilation provided.

In vessels having between decks it is a good idea to lay the hatchboards grating fashion, but as cargo has to be stowed above it is necessary to use all the hatches for additional strength. They may be laid as indicated in Fig. 18.

During the loading, the covers must be left off as much as possible, the hatches being protected by tents. An endless current of air passing to the bottom of the hold should be provided, this being the only means of getting rid of the gases generated by the fruit and thereby keeping it in good dry condition.

The packages of fruit should not be stowed too high in the hold, but sufficient air space left on top of the cargo. When carrying fruit with other cargo avoid stowing it over any article that will heat it. Also, as fruit usually heats and gives off a quantity of moist vapour which will condense on the cooler parts of the vessel, it is advisable not to stow dry goods in the same hold if it can be avoided.

The loading of fruit requires the best personal attention of all concerned, especially the officers of the carrying vessel. It is not sufficient to leave it to stevedores and others, who may, or may not provide the necessary ventilation consistent with the conditions in which the fruit is shipped, as this must be taken into consideration. For example, very ripe oranges require considerably more ventilation than those which are only partially ripe.

During the voyage hatches must be kept open as much as possible, but we fear sufficient attention is not paid to this point. It may be thought that it is dangerous to keep the hatches open when the weather becomes bad, but it is surprising with a little care how well a ship can be ventilated, even in fairly bad weather, if sufficient effort is made. Tarpaulins or awnings can usually be battened down "tentwise" and made watertight in the battens on the weather side of the hatch, and efficient ventilation given on the lee side. A fruit ship is usually "light," so it is seldom, unless in very bad weather, they take any heavy water on board.

A little salt water spray does little or no harm, but wetting with rain or fresh water must be guarded against, as some fruit, e.g., oranges that are once wetted with water will soon start to decompose.

Special care should be taken with fruit picked in wet weather, as it is usually very difficult to carry and often turns out in bad condition.

A great quantity of fruit is shipped from the Mediterranean ports during the season—the usual fruit carried being oranges, onions, lemons, grapes, etc.

Oranges and **lemons** are usually wrapped in tissue paper and packed in crates. Such fruit should be stowed with air passages right through the holds, leaving a space between two rows of cases fore and aft every four or five tiers, and these should lead into a space left at both ends of the hatch which should be left clear right across the ship to the bottom of the hold as shown in Fig. 19.

In leaving these air channels one must of necessity be guided by the condition in which the fruit is shipped. For example, fruit that is nearly green will not require as many air spaces as fruit that is more or less ripe. When it is in this condition it is advisable to leave extra space as shown by the dotted lines in Fig. 19

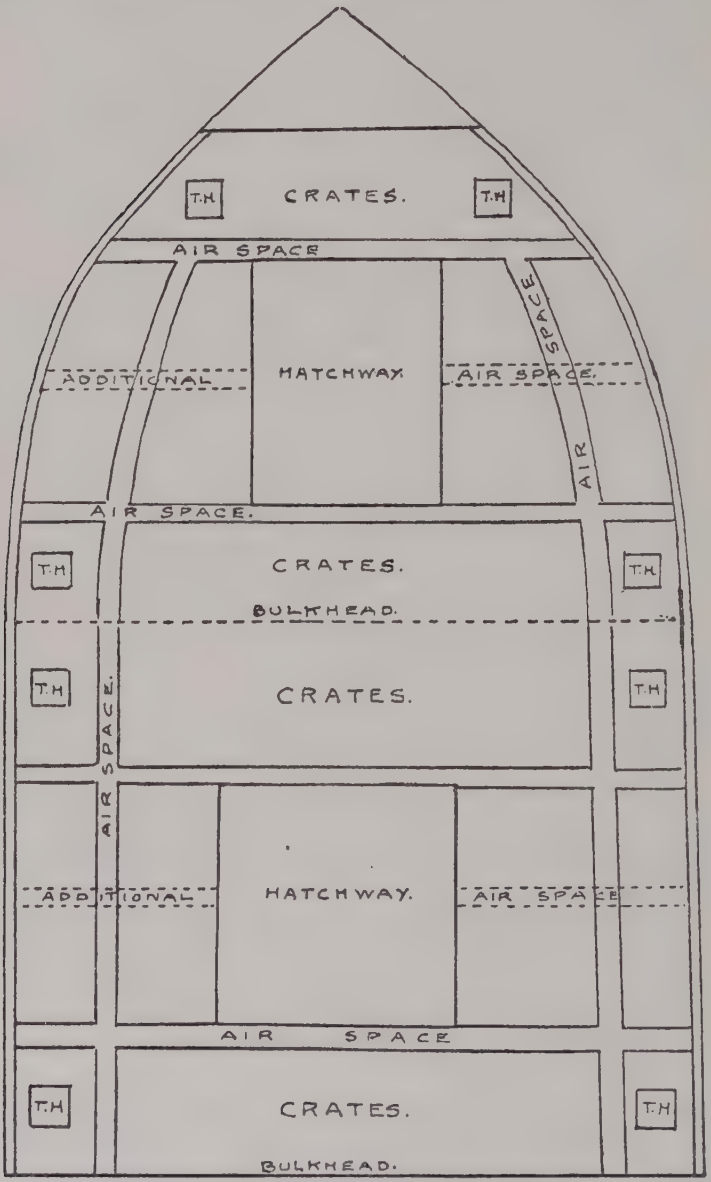

T.H
CRATES.
T.H
AIR SPACE
AIR SPACE
ADDITIONAL
HATCHWAY.
AIR SPACE.
AIR
AIR SPACE.
T.H
CRATES.
T.H
BULKHEAD.
T.H
CRATES.
T.H
AIR SPACE.
ADDITIONAL
HATCHWAY.
AIR SPACE
AIR SPACE
T.H
CRATES.
T.H
BULKHEAD.

FIG. 19

FRUIT CARRIAGE IN ORDINARY VESSELS—DEPICTING PLAN OF VENTILATION. TOP DECK REMOVED, BUT SHOWING TRIMMING HATCHES

Onions are unwrapped and often packed in crates which can be usually stowed in a similar manner to oranges.

Grapes are generally shipped in barrels or cases packed in granulated cork and require no special stowage. **Pears, Apricots, Plums, Damsons** (especially **Greengages**), **Raspberries and Strawberries** are usually carried only on cross-Channel voyages from the Continent in baskets in their natural ripe condition; but latterly many of these fruits are carried fresh in steamers with cold storage (for which see page 155).

Apples are carried from Canada, Australia and the U.S.A., in large quantities in barrels, which should be stowed in a well ventilated hold, kept as cool as possible and free from pressure.

Grape Fruit, Green Limes, etc., are usually carried in boxes, and may be stowed in a similar manner to oranges.

Dates are sometimes carried in baskets of an inferior quality, but are now carried almost universally in cases. (See page 58).

Figs come largely from Smyrna in boxes and in cases, but the inferior kinds are carried in bags, casks and boxes. They require no special stowage.

Pineapples are usually shipped fresh in crates which must be carefully handled to avoid bruising.

Tomatoes are largely carried from the Canary Islands, wrapped in tissue paper in paper-lined boxes in a mixture of dry peat and sawdust. The boxes are usually about 7″ × 10″ and hold 14 to 16 lb. of tomatoes, four of the boxes being strapped together with wooden battens to form a case.

Bananas are usually carried in specially constructed vessels at certain specified temperatures according to the condition of the fruit (see page 157). A large quantity, however, is carried on short voyages in ordinary vessels; and as in the case of other fruit, ventilation is specially needed. Figs. 19 and 20 show a good method of allowing air spaces when carrying bananas. Shipmasters who have been engaged in the trade will no doubt have their own methods of stowage and ventilation, but those indicated in the figures can be recommended.

The first day out from the loading port it is advisable to reduce the temperature if possible to about 50° F. This may possibly be achieved by the judicious use of windsails. With green bananas there is a danger that the temperature may be reduced too low, and if this is brought below say 46°, then ventilation must be stopped, and only be reintroduced in any especially warm places, as if the fruit arrives too cold it will not ripen for the market. It is advisable to use a thermometer frequently. The temperature of the compartments should be taken at least every watch, and in the shadow on deck for the deck cargo, and carefully recorded.

It must be remembered that it is not the actual heat that will damage the bananas, but the stagnant air, and therefore **it is always essential to have a good circulation of air through the cargo.** This can always be arranged by windsails laid right down through the air trunks and deck ventilators, remembering that the current of air underdeck is in a contrary direction to that b ove deck.

Trimming hatches should be kept off and air spaces should be left over the crates. Any efficient system of locking the crates can be employed when leaving the air channels, to prevent the crates shifting.

On no account should crates be stowed in the square of the hatch; this should always be left clear to allow good ventilation. The air spaces in the lower hold as shown in the sketch should be from 2 to 3 ft. wide, so that a man can walk round at sea and observation kept on the fruit.

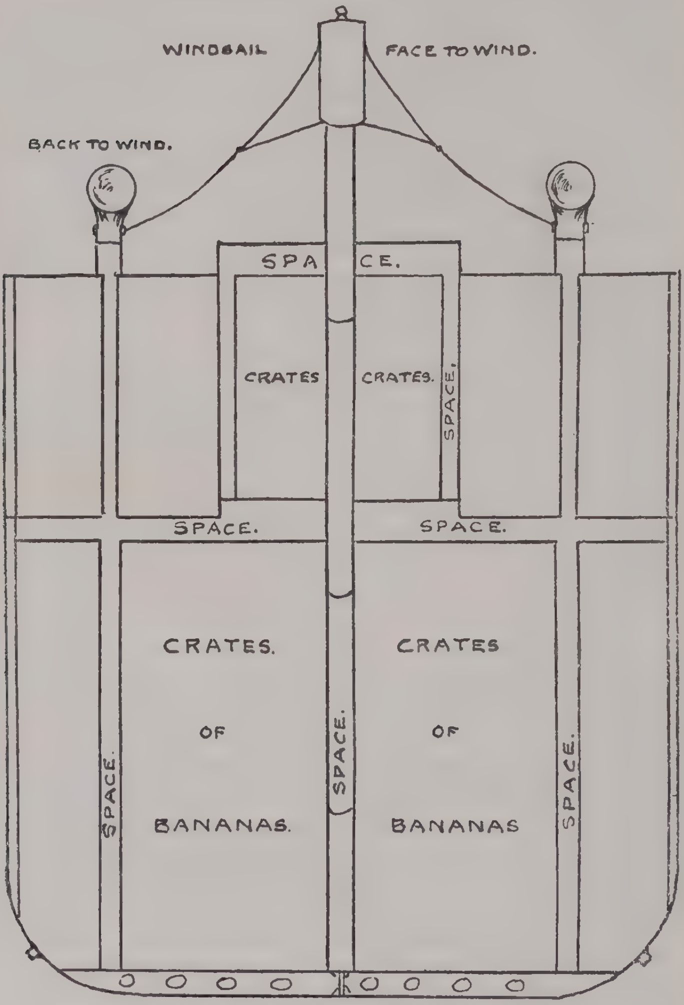

WINDSAIL
FACE TO WIND.
BACK TO WIND.
SPACE.
CRATES
CRATES.
SPACE.
SPACE.
SPACE.
CRATES.
OF
BANANAS.
CRATES
OF
BANANAS
SPACE.
SPACE.
SPACE.

Fig. 20

Banana Carriage in Ordinary Vessel—Showing Elevation of Ventilator

Bananas should not be stowed more than nine crates high.

This provides against the placing of too great a weight on the lower crates which may be crushed.

A large quantity of bananas are shipped from the Canary Islands on any homeward bound vessel during the summer, both on and under deck. In winter, the average vessel, unless built for the trade, is not suitable ; because if the fruit is carried below it cannot usually get sufficient ventilation, and if carried on deck will be injured by frost.

Each bunch of fruit is wrapped in cotton wool and paper before being put into crates, where it is packed in banana leaves and straw to prevent movement. With smaller bunches, several of them are placed in one crate.

Large quantities of fruit are shipped and carried in tins or bottles, but nothing need be mentioned here as regards the stowage. Fruit in tins, packed in cases, can be stowed in a similar manner to any other canned goods (q.v., page 49,) but they should not be stowed above any cargo liable to heat.

As regards dried fruits ; these are shipped in various forms, and are mostly mentioned under their separate headings. In most cases they are shipped in boxes of varying sizes which require no special stowage, but care must always be taken in the allotment of space to carry such fruits, as it is most essential to see that they are not stowed near any goods that will damage them by taint.

GENERAL CARGO

Goods carried in units or small quantities of varying nature and class and loaded in one vessel constitute what is known as a " general cargo." In this case the weight, size, condition and nature of packages or goods vary to such an extent that it is impossible to lay down any specific rules as to how a " general cargo" should be stowed. Consideration must be given to the vessel's stability and also to the fact that it is necessary to utilise the cubic capacity of the vessel to its fullest extent.

Regard must also be paid to the properties of the various articles shipped, in order that no damage may be done by one portion of the cargo to another.

In Ch. II we have mentioned as far as possible the requirements of each article as regards stowage, and in most cases have pointed out any peculiarities that they may possess, and which should be regarded when stowing any of these as part of a general cargo.

One of the first points to consider in stowing a general cargo is the nature of the packages : that is of any goods that are packed. It frequently occurs, however, that many articles are stowed in a general cargo which are quite unpacked and unprotected. These should be given special consideration having regard to their liability to be easily damaged.

All heavy weights should of necessity be stowed as low as possible in the vessel—not only from the point of view of stability, but also from the fact that if heavy weights are stowed above lighter ones naturally there is a liability for serious damage.

In this connection it will often be found that heavy goods are packed in somewhat light packings. Of all classes of merchandise carried amongst general cargo, the most difficult to deal with are those (of which there are many), that may be classed as " packing too frail for contents."

Another point that requires consideration as far as a general cargo is concerned, is to determine what articles to use for broken stowage. No case or other goods which are easily crushed should be used for this purpose, as **it is far more profitable to leave a certain amount of space in the holds of a vessel than to fill up with some kind of cargo which is almost certain to be damaged and lead to heavy claims.** This specially applies to goods packed in crates, cartons, or light bales.

Care must be taken when stowing " soft " cargo such as bales, bags, etc., amongst what we may term " hard " cargo such as case goods, iron, etc. The first consideration must be given to the separation of these articles to avoid chafage, or damage by coming in contact one with the other. Another point to be borne in mind is that of " sinkage," as it often occurs that where a few tiers of soft goods are stowed beneath hard goods the soft goods will give or " sink," and this will throw the cargo stowed above out of line, and will often cause serious damage.

Another point to be remembered when stowing a general cargo is to discriminate between dry and wet cargo, so as not to mix the two in such a way that damage may result.

When stowing general cargo in a deck over an insulated compartment containing frozen cargo, it is advisable to spread 2 or 3 inches of sawdust, and more at the bulkheads. This is to absorb any condensation which may occur from the frozen compartment.

It is unnecessary to mention anything further with regard to the stowage of a general cargo, as in Chs. I and II we have described the stowage required for each article and container that would be carried in such a cargo.

GRAIN

Grain may be considered in two forms, viz. : heavy grain, such as wheat, maize, corn, rye, etc. ; and light grain, such as barley, oats, etc.

Grain was formerly carried mostly in bags and only occasionally in bulk ; but the bulk trade is apparently increasing, for it is found that it is much more suitable and economical to carry grain in this way, especially as the modern appliances render it more suitable for handling. It is also largely carried in full cargoes in bulk and bags ; but often a vessel will have only one or two holds filled with grain.

When stowed in bulk, owing to the angle of repose of grain (which will vary with the kind of grain), with the vessel's movement it becomes a cargo liable to shift, and precautions must be taken to prevent this, by the erection of shifting boards and feeders as shewn in Figs. 21 and 22.

The carriage of grain is now governed by certain regulations laid down by the Board of Trade in this country and various other authorities in foreign ports.

Vessels carrying more than one third of their net registered tonnage of grain are considered as grain-laden vessels and must abide by these regulations.

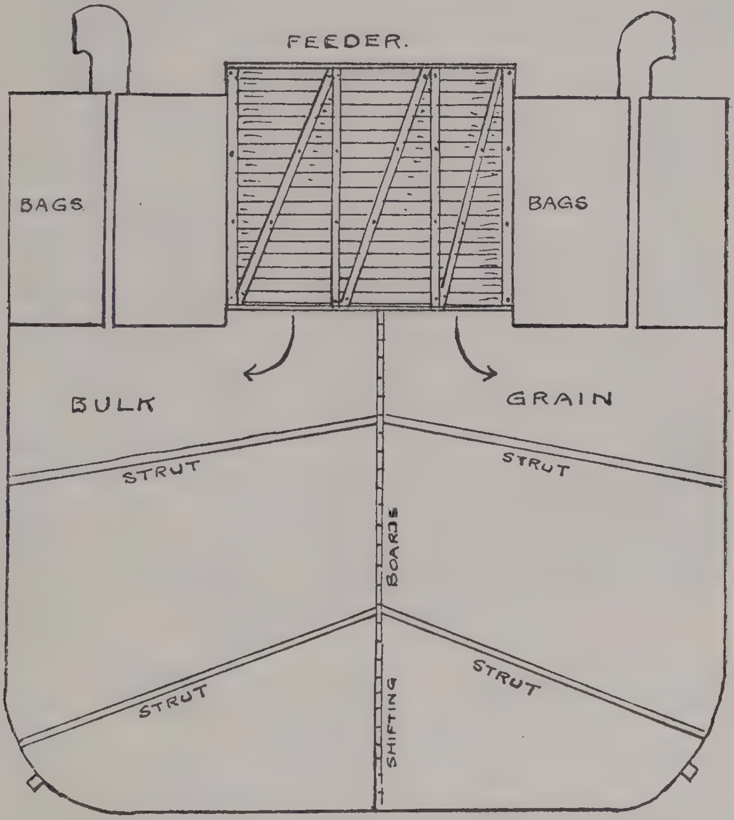


FIG. 21

GRAIN IN BULK—SHOWING SHIFTING BOARDS AND FEEDER

The most important thing as regards the stowage of a grain cargo in bulk is to see that it is well trimmed and that every hold is thoroughly well filled. It is not sufficient to leave this to be done only by the trimmers, but every officer or person concerned should give the matter his own personal attention.

Another important point is the question of "mixture." It frequently occurs that grain may be shipped in small parcels and one has to stow two or three different kinds of grain in one hold. In this case they are usually separated by what are called separation cloths.

Great care is necessary in making these separations; on no account should the cloths be laid tight, but sufficient slack always left to allow for a certain amount of sinkage of the cargo. The cloths should be nailed along the shifting boards with scupper

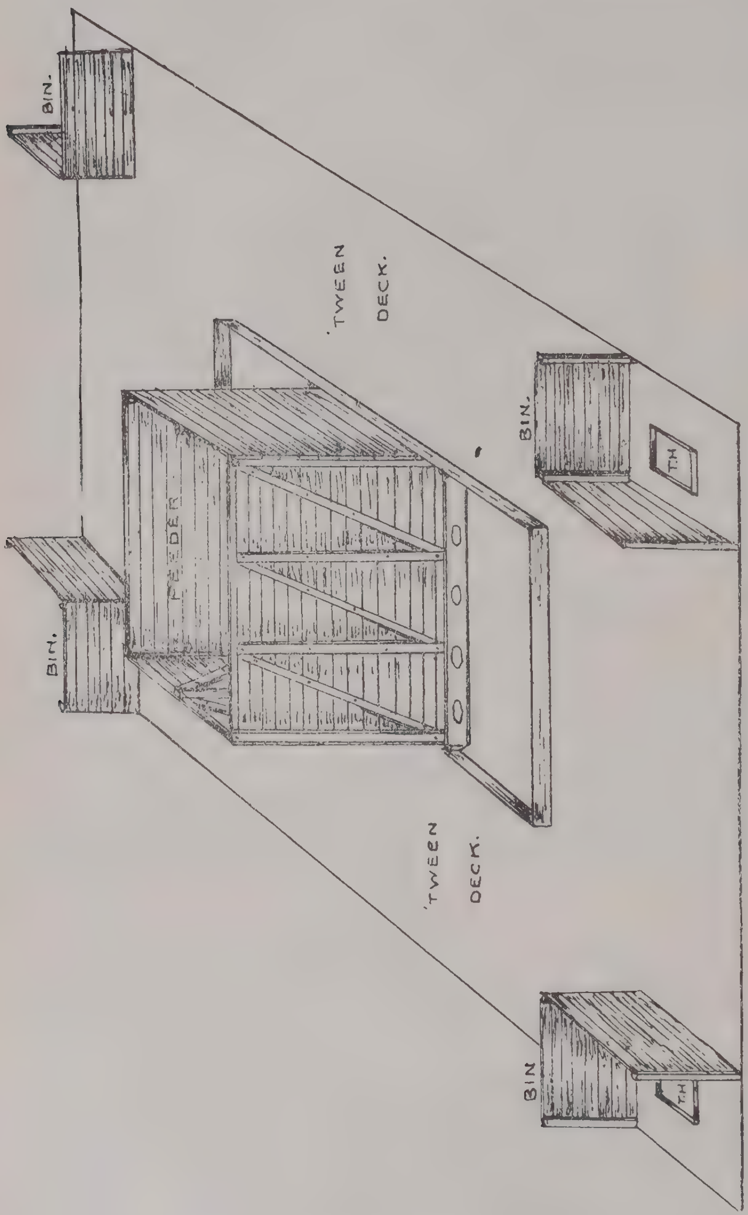


FIG. 22

GRAIN IN BULK—DEPICTING A TWEEN DECK IN PLAN, WITH UPPER DECK REMOVED, SHOWING "FEEDER" AND "BINS" nails and tucked well in beneath the cargo battens on the ship's side.

It is also an excellent plan if sufficient old and empty bags are available to pack one bag in between each frame behind the cargo battens; by this method, and if care is taken, there should be very little mixture.

Another point that has to be taken into consideration when carrying various parcels of grain in bulk is, which grain should be stowed under or over the other. Some seed or grain will penetrate more than others; e.g. rape or similar seeds will find their way through practically any place and cause mixture, where wheat would not.

For example, if one had a parcel of rape seed, wheat and oats to be stowed in a hold, the rape seed should be stowed below, the wheat next, and the oats on top. By this means, if a slight mixture occurred, the oats and wheat would do very little harm by becoming mixed, and if any of the wheat is mixed with the rape seed it can be easily separated by a sifter.

The stowage of grain in bags requires considerably more attention than that of grain in bulk. **In all cases the ship must be thoroughly clean, holds dry, dunnage laid and all iron well covered.**

The actual stowage of the bags has already been described in Ch. II, but care must be taken at all times regarding ventilation, having due regard to the nature and condition of the cargo.

It is not sufficient to simply load a grain cargo, batten the hatches down, and trust to luck that the cargo will turn out in good condition. **On all favourable opportunities hatches should be opened and cargo examined, and if the weather is good they should be left open during parts of the day. The hold ventilators also require careful attention at all times.**

It is appalling to note how much damage is caused to grain cargoes through want of ordinary care and neglect of the above-mentioned simple precautions. We have frequently had cases come to our notice where vessels have loaded, battened the hatches down (and sometimes the ventilators), and have arrived in port without any attempt having been made to ventilate the cargo during the passage. Is it surprising that when these vessels are discharging serious damage is found to have occurred to the cargo by heavy sweat? This lack of ventilation is often coupled with a shortage or complete absence of dunnage.

We have recently had cases where two vessels have come from the same port, loaded similar cargoes about the same time, and experienced identical weather during the voyage. One of these vessels turned out her cargo in splendid condition, whilst the other had her cargo seriously damaged. This contrast we say without hesitation was caused by the latter vessel's stowage, **as we consider insufficient dunnage or lack of ventilation is undoubtedly "bad stowage."**

HEAVY WEIGHTS

The stowage of heavy weights naturally depends greatly on circumstances, viz. the size, the shape, and the adaptability of the articles to be handled and slung. Consequently it is almost impossible to lay down any hard and fast rules that would be useful to our readers, but there are, however, certain principles that should always be borne in mind when stowing goods of this nature.

First of all, it is of the utmost importance to select a good place to stow a heavy lift, one where it can be easily placed, and from which it can be as easily discharged.

The next thing is to see that it is properly bedded, so as not to damage itself, or anything underneath it. It is not sufficient to see that a heavy weight lies " comfortable " in a certain position when it is loaded, but account must be taken of the movement of the vessel in which it is stowed whilst on the voyage. When a ship is subject to a heavy movement, such as violent pitching in a seaway, the heavy weight naturally acquires additional force to crush anything beneath it. For example, an ordinary case cargo is perfectly safe whilst in the hold of a vessel in dock. In a seaway, however, it will often be found that the lower portions of the cargo are crushed. The same principle applies to the side movement ; a lift is perfectly safe—no matter what cargo is alongside it—whilst the ship is still, but immediately the vessel starts to roll unless the lift has been properly secured, it is not properly stowed and may cause considerable damage.

The best position to select for a heavy weight is on the bottom of one of the largest holds, in the hatch square if available. This will permit of it being lowered straight down into the hold and it can be lifted easily from this position. If it is stowed off the plumb of the hatch it will of necessity be far more difficult to load and discharge.

Having selected a stowage position, a good solid bed should be laid for the weight to rest on. If it is of an unusual shape, a proper bed should be arranged to fit it ; if it is flat, then a suitable flat surface should be selected. As regards securing heavy lifts, this of course depends on circumstances, and all we can say is that all such articles must be **well and properly secured.**

If there is no other cargo available to stow around and above the lift, it should be tommed and shored from the vessel's sides or bulkheads and, where there is no cargo stowed above, it must be well tommed down. It may occur that a lift be stowed alongside the stanchions or pillars in the lower hold, in which case it should be well lashed to them. Modern ships are now usually constructed with few or no stanchions, but they are generally provided with heavy pillars at the corners of the hatches to which heavy lifts can easily be secured.

If the lifts are to be lashed we recommend chain lashings to be used if available, as these can be more easily tightened by hand, and when frapped and wedged are most rigid.

In the foregoing we have assumed that it has been possible to stow the heavy weight in the bottom of the ship, but owing to unforeseen circumstances it might be absolutely necessary to stow it in a tween deck or even an upper deck, in which case great care must be taken to see that this deck is well shored from below to take the additional weight.

We do not propose to make any suggestions regarding the handling of heavy lifts, as the persons concerned must be guided by the circumstances under which they have to handle them. Most ports are now provided with the necessary lifting cranes, and modern ships are likewise provided with gear to handle lifts, but if it happens that a vessel has to discharge such lifts in a port where there are no facilities, we feel sure that we can leave this entirely in the hands of the shipmaster, who is usually resourceful and quite capable of overcoming such difficulties.

In handling large boilers, where perhaps there is a difficulty in getting craft to take them in some ports, one must not overlook the fact of how easy it is to make the average boiler its own medium for floating ashore by plugging up all holes and making it watertight, when it will usually float.

To determine whether the boiler may be floated, its gross weight will be known, and its cubical capacity if not stated can be obtained by measurement. Then remembering that 35 cubic feet of salt water (36 cu. ft. fresh water) is equivalent to a weight of one ton, the weight of water displaced by total submersion is found by dividing the cubical capacity by 35 (or 36).

If this weight exceeds the weight of the boiler then the article will float. It is assumed of course that the package, whatever it may be, is perfectly watertight.

For example, a boiler weighing 35 tons has a cubical capacity of 1575 cubic feet. Hence the weight of water displaced by total immersion is $\frac{1575}{35} = 45$ tons.

Therefore, the boiler will float with 7-9ths only being submerged. One might say that this boiler has 10 tons of flotation, meaning that if the boiler displaced its whole volume of water the weight of this water would exceed its own weight by 10 tons.

For the stowage of heavy weights on deck, see Deck Cargo, page 116.

JUTE

Jute is a fibre obtained from an Indian plant. It is really a coarser flax or hemp, manufactured largely for packing canvas and many other articles such as carpet backings, and fabrics for the base of linoleums, etc.

Jute is usually packed in pressed bales, each of which consists of many skeins or bundles. In the season it is much shipped from Calcutta, and many full cargoes are carried. At one time it was generally screwed into a ship in an almost similar manner to cotton, but the loss of time and the additional expense incurred in so doing do not warrant this being done at the present day.

Before loading jute care must be taken to see that the holds are thoroughly cleaned and perfectly dry. All floors, decks, etc., must be well matted and the bales must not be allowed to touch iron on any account, or rust will badly damage the contents.

It was at one time thought that jute was liable to spontaneous combustion, but this has never yet been proved and is still open to doubt. It is, however, especially necessary to use all precautions to guard against fire, as if a flame comes in contact with a bale of jute, it will spread over the outside edge like a flash, and it has been known where a lamp accidentally touched a bale of jute for the flame to run right underneath a deck where it was impossible to extinguish it with water.

A cargo of jute, especially new jute, is particularly liable to sweat, therefore every precaution must be taken with regard to the ventilation of holds.

It is particularly advisable to leave air spaces in the hatch coamings, and also underneath the deck ventilators in order to afford a passage for the vapour to rise.

LIVE STOCK

This term covers any animals being carried alive, such as horses, cattle, sheep, etc.

Many special regulations are in force in various parts of the world as regards the period of quarantine, etc., and Shippers, Masters, Officers, and all concerned should acquaint themselves with these.

" The Handbook of the Diseases of Animals Acts and Orders of the Minister of Agriculture and Fisheries, 1926," is the official publication on this matter, and interested parties are advised to procure it.

With regard to the construction of stalls for the animals, it may be safely said that if the British law has been complied with, then no other country's regulations will conflict with it.

OILS

The world-wide use of oil for divers purposes compels the carrying trade to give special consideration to oil cargoes.

The huge quantities now transported to meet the requirements of modern civilisation have necessitated the carrying of the commodity in bulk in specially constructed vessels, and in these tank steamers many millions of tons of oil are carried annually. The more important oils so carried are benzine, crude petroleum, gasoline, kerosene, fuel oil, naphtha, creosote, and lubricating oil.

Individual companies have their own methods and arrangements; their vessels being especially adapted for their own particular trade, consistent with the class of oil carried, and conditions prevailing at the ports of loading and discharge. Such cargoes are not within the province of this work.

Oil, however, is still carried as full cargoes and as part of a general cargo, and consequently a brief description of the various types carried and their methods of stowage may not be out of place. In ships other than tank steamers oil may be carried in three ways, viz. in barrels, in cases, and in small quantities in various packings in general cargo.

Barrels. In the past, in the days of sail many vessels carried oil in barrels, but at the present day one seldom hears of a full cargo of barrel oil. Some oils, such as lubricating or cylinder oil, are, however, still transported in large quantities in barrels, and in tank steamers these are usually carried in the tween decks. Frequently barrels of oil are carried in a general cargo, in which case the consignment requires ordinary barrel stowage for liquids as described in Ch. I and needs no special description here. Special care, however, must be taken in the selection of the compartment for stowage, bearing in mind the other commodities of which the general cargo may consist. Oil is a source of danger to other cargo, either from itself or from its odour, and hence must not be stowed amongst other goods which may be damaged by either of these sources, as no matter how well the barrels of oil may be stowed, there is **always a risk of leakage,** or breakage.

Oil should not be stowed in tween or upper decks in a general cargo, but by itself in a portion of the lower holds. If for any reason it is necessary to stow barrels in the tween decks great care must be taken to see that the scuppers are clear to allow any leakage to run direct into the bilges. If the lower hold contains grain, such stowage is not permissible, as if oil gets into the bilges beneath this cargo the grain will be seriously damaged by taint.

Cases. The carriage of oil as case oil is apparently on the decline. Years ago petroleum was always carried in such manner, especially to India and the Far East, as this provided an easy method of distribution for long distances inland. But of late years the tendency of many of the large oil companies has been to establish depots in the East to which the oil is carried in bulk, and there canned in their own stations for distribution inland.

For the stowage of case oil, the holds must be carefully cleaned and dried and no old or dirty dunnage used. In nearly all ports in the U.S.A. case oil is loaded under the personal direction and supervision of a surveyor appointed by the New York Board of Underwriters, who will insist on cases being stowed according to certain rules formulated as the result of many years' experiment and practical experience.

But the fact that the stowage is carried out under this supervision, does not entirely exonerate or relieve the ship of the responsibility of taking due care for the preservation and good carriage of all cargo.

Although the above mentioned surveyor is careful to see that the cargo is loaded in such a manner that it is properly stowed, he has no interest whatever in the number of cases taken in a given capacity. In calculating the space for stowage of case oil one can fairly safely reckon the stowage capacity as 2 cu. ft. per case. This is over the whole vessel. In large ships, in say the middle holds, cases will often stow in less space than this; on the other hand, in the end holds and in smaller compartments it will require considerably more space for stowage.

In stowing case oil the greatest care must be taken to keep all the tiers perfectly level. For example, when the ground tier is being laid, the cases must not be extended the slightest degree into the turn of the bilge or into the " run " where it is necessary to cant one corner. Such stowage would necessarily place additional pressure on the one corner of the case and certainly damage it, and might even " break " the whole stowage in a hold. The tier should be started from amidships, or in the after holds alongside the tunnel and worked towards the wing. Immediately the floor starts to rise, the space should be left, filled in with dunnage, and the next tier carried out over this, still keeping the line of cases perfectly level.

It is always customary to floor over the first tier, and in deep holds to floor again after about the fifth or sixth tier.

Cases must on no account be stowed on their flats except occasionally between the beams on the top tier, where there is not room for an upright case.

Case oil should also be exceptionally well " blocked off " with wood, as the slightest movement when the vessel is rolling will cause chafage and much leakage.

Various. Oils shipped in small quantities may be carried in drums, kegs, or bottles securely packed in strong cases and their stowage in general cargo should offer little difficulty.

Special rules for the carriage of certain oils in barrels have been laid down by the National Board of Marine Underwriters of America and are here inserted.

LOADING OF TURPENTINE, RESIN, COTTON SEED OIL, AND PETROLEUM OIL IN BARRELS.

Rules of the National Board of Marine Underwriters of America.

Vessels loading a cargo of general merchandise without cotton may carry turpentine, petroleum or its products, in barrels, by complying with the following rules :—

Turpentine, petroleum or its products, in barrels, shall not be carried on cotton-laden ships, and the term " cotton-laden " shall apply to all vessels the cotton cargoes of which shall more than fill the cargo space either forward or abaft of the engine-room, and turpentine, petroleum or its products, in barrels, when carried on vessels having cotton shall in no case be stowed either forward or abaft of the engine-room with cotton.

The stowage of these commodities must be separated by engine-room space and bulkheads. No turpentine, petroleum or its products, in barrels, shall be carried in the same compartment with cotton, flour, or other cargo liable to damage by the fumes arising from these shipments.

In every case the loading of turpentine, petroleum or its products, in barrels, to be under the direction and inspection of a surveyor of the National Board of Marine Underwriters, who shall issue a certificate stating the same is loaded with his approval.

Resin may be loaded on cotton-laden vessels if it be stowed by itself, in a separate compartment in which there is no cotton or other cargo of a combustible or inflammable nature.

1. Every shipmaster who intends to put barrel oil in his vessel, must notify a surveyor of the National Board of Marine Underwriters,and have the vessel loaded under his instructions.

2. No more than seven tiers of cotton-seed, turpentine, petroleum or its products, in barrels, shall be stowed in any hold or between any two decks. No other cargo to be stowed on top of seven tiers of oil, except light cargo, with the consent of the owner.

3. Cotton-seed oil and other oil in barrels shall not be stowed on top of, or over any cargo which is liable to damage through contact with oil.

4. In single-deck or in double-deck vessels with a deep lower hold a temporary structure shall be erected, made in the following manner, and with the undernoted conditions :—

> (*a*) A deck of 3-inch pine plank to be laid over pitch pine beams of dimensions not less than 6″ by 6″, and not more than 7 feet apart, and supported by 6″ by 6″ pitch-pine stanchions under the centre of beams and in the quarters and at the ends. The end stanchions may be dispensed with when the flanges at the side of the vessel are sufficiently broad to support the ends of the beams.
>
> (*b*) If the beams are closer than 7 feet, then 2 or 2½-inch planks laid close together on the beams may be used, and to be secured from side to side.
>
> (*c*) Where the beams are farther apart than 7 feet heavier material in proportion must be used, all to be regulated by the inspector.
>
> (*d*) All stanchions to extend from the bottom of hold or from the ceiling over the tanks. Such temporary deck to be made under the inspection of the National Board surveyors, and the number of tiers of barrels to be placed on it shall be at the discretion of the Board's surveyor.

5. Vessel with cabin and/or forecastle entirely under deck will not be permitted to load naphtha, gasoline, benzine, or spirits of petroleum, unless separated from cabin and/or forecastle by iron bulkheads.

6. All vessels loading barrels or cases, especially those taking crude oil, benzine, gasoline, naphtha, or spirits of petroleum, must be ventilated through all the hatches, unless already fitted with suitable permanent ventilators fore and aft approved by the inspectors, and when any one compartment is filled the above ventilators to be covered with wire gauze.

7. All barrels must be stowed bung up, and care must be taken that the chimes are kept free from the sides of the vessel in the ends.

8. No barrel is to be stowed in a place where there is not sufficient room without "riding."

9. All barrels must be stowed in straight tiers fore and aft. In no case will it be permitted to stow with the sheer of the vessel (rounded off).

10. In places where a barrel can not be stowed, wood or suitable dunnage must be fitted in carefully in order to secure the barrels in the tier

11. No hanging beds will be permitted under any circumstances.

12. The barrels must be stowed bilge and cantline and every barrel properly bedded and well chocked.

13. In the ground tier each barrel must rest on two softwood beds, not less than two inches in thickness placed by the quarter hoops, leaving the bilge of the barrel free about 1 inch.

14. No barrel to be stowed athwartship without special permission of the inspector, and in no case will it be permitted when the barrel is subject to any pressure.

Classification of Oils

Oils are generally classified according to their origin and are either mineral, vegetable, or animal.

Mineral Oils may be shipped in the crude state under the name of petroleum, mineral naphtha or rock oil.

Shale Oils, used for illuminating and lubricating, are also mineral oils, and are obtained by distilling certain coal-like minerals such as Bog-head Cannel.

Most frequently the crude petroleum is subjected to treatment at the source, and the product then shipped is called by various names according to the method and extent of refinement.

From **American Petroleum** the following products are obtained in succession :—

1. **Cymogene.**—The condensed gases from petroleum, and used in freezing mixtures.
2. **Rhigolene.**—A distillate used as an anæsthetic.
3. **Petroleum Spirit, Petroleum Ether** and **Gasoline.**—Used in rubber solutions and cleaning oils.
4. **Naphtha, Ligroin, Benzoline.**—Burning oils and solvents.
5. **Benzine, Petrol and Kerosene.**—The former must not be confused with Benzene, a product of Coal Tar.
6. **Lubricating Oils.**
7. **Petroleum Jelly, Vaseline, Paraffin Wax.**

While the term " mineral oils " is the general name applied to the oils obtained by the distillation of petroleum as well as to those obtained by the distillation of coal, brown coal, wood, peat, and bituminous shale, there has now become a fashion to use the name " mineral oil " exclusively for lubricating oils and embody all others under the name **Petroleum and Petroleum derivatives.**

Specific regulations for the stowage and transport of petroleum and its derivatives in vessels other than those specially constructed are laid down by the Board of Trade, extracts from which are inserted here by permission.

PETROLEUM

Petroleum Spirit (Petrol) must not be carried in emigrant ships.

In passenger ships a limited quantity may be carried in short coastwise voyages only (*see* para. (*e*)).

Petroleum spirit gives off vapour freely at ordinary temperature. This vapour will form an explosive or inflammable mixture with air according to the proportion in which it is present.

In order that the transport by sea of this substance may be carried on with reasonable safety it is recommended that in ships other than those properly constructed for the carriage of bulk spirit the following precautions should be observed :—

(*a*) Only iron or steel ships should be used for the carriage of petroleum spirit. The bulkheads dividing the space or compartment allotted to this cargo from any other space should be perfectly gas-tight and without openings and where there are bilge sluices, these should be sealed efficiently and remain unopened while any petroleum spirit is on board. The whole compartment (where it is possible to allot a separate hold for this class of cargo) should be as nearly as possible hermetically sealed. This is unquestionably the safest way to carry this class of cargo ; but where the petroleum spirit is only a proportion of the total cargo in a hold, efficient ventilators must be provided, half of which should extend to the bottom of the space and the other half only a short distance below the deck. The short ventilators should be labelled " Outlet or to Leeward " and the long " Inlet or to Windward." These ventilators should have large cowl heads, the openings being covered with double fine brass wire gauze.

(*b*) The spirit should be contained in properly constructed steel casks or drums fitted with screw caps hermetically sealed, or in other equally efficient containers. Wooden barrels are not considered satisfactory for the carriage of this commodity.

(*c*) Special precautions should be taken against smoking and the use of lights or fire of any kind while the cargo is being loaded or unloaded, or while the hatches are off, or any deck openings uncovered. It should also be remembered that the risk from the inflammable nature of the cargo does not cease even when it has been discharged, and before any lights are used in the compartment which contains the spirit, special precautions should be taken to ensure that the space is clear of the vapour. It is also important to remember that the carriage of empty drums or casks which have contained petroleum spirit requires equally efficient precaution and in all cases the screw plugs should be tightly adjusted.

(*d*) In cargo ships no objection will be raised to the carriage on deck of a limited quantity of petroleum spirit in steel drums, or substantial tins in cases, provided the receptacles are staunch and sound and are so stowed as not to interfere with the navigation of the ship, or make the vessel unseaworthy. *See also* paragraph (*f*).

(*e*) In passenger ships engaged in short coastal voyages a limited quantity of petroleum spirit may be carried on deck provided proper precautions are taken regarding stowage and keeping the packages away from passengers' promenade, or deck space.

(*f*) In all cases where this class of cargo is carried on deck, conspicuous notices shall be posted up drawing attention to the danger arising from smoking or striking matches near the deck cargo.

These instructions refer to petroleum within the meaning of the Petroleum Acts and therefore include any liquid which is produced by distillation from petroleum shale or coal and flashes at a temperature of less than 73° F. as ascertained by the first schedule to the Petroleum

Act, 1879, such as Benzolene, Gasolene, Petrol, Naphtha, Benzol, Benzine, Lythene, etc., etc.

These regulations also apply to compounds of petroleum which flash at a lower temperature than 72° F. and to mixtures whether fluid, viscous or solid of petroleum with other substances which flash at less than 73° F.

It is desirable that the same precautions should be adopted in the carriage of heavier qualities of oil in climates in which the average temperature of the air rises appreciably above the flashpoint of the oil.

PETROLEUM ACT

3. For the purposes of this Act the term " petroleum " includes any rock oil, Rangoon oil, Burmah oil, oil made from petroleum, coal, schist, shale, peat, or other bituminous substance, and any products of petroleum, or any of the above-mentioned oils. . . .

4. Every harbour authority shall frame and submit for confirmation to the Minister of Transport byelaws for regulating the place or places at which ships carrying petroleum to which this Act applies are to be moored in the harbour over which such authority has jurisdiction, and are to land their cargo, and for regulating the time and mode of, and the precautions to be taken on, such landing. The harbour authority shall publish the byelaws so framed with a notice of the intention of such authority to apply for the confirmation thereof. The Minister of Transport may confirm such byelaws with or without any omission, addition, or alteration, or may disallow the same.

Every such byelaw when confirmed shall be published by the harbour authority, and may be from time to time altered or repealed by a byelaw made in like manner. Byelaws under this section shall be published in such manner as the Minister of Transport may from time to time direct.

If at any time it appears to the Minister of Transport that there is no byelaw for the time being in force under this section in any harbour, the Minister of Transport may, by notice, require the harbour authority of such harbour to frame and submit to them a byelaw for the purposes of this section, and if such harbour authority make default in framing a byelaw and obtaining the confirmation thereof within the time limited by such notice, the Minister of Transport may make a byelaw for the purposes of this section, and such byelaw shall have the same effect as if it had been framed by the harbour authority and confirmed by the Minister of Transport.

Where any ship or cargo is moored, landed, or otherwise dealt with in contravention of any byelaw for the time being in force under this Act in any harbour, the owner and master of such ship, or the owner of such cargo, as the case may be, shall each incur a penalty not exceeding fifty pounds for each day during which such contravention continues, and it shall be lawful for the harbour master or any other person acting under the orders of the harbour authority of such harbour to cause such ship or cargo to be removed at the expense of the owner thereof, to such place as may be in conformity with the said byelaw, and all expenses incurred in such removal may be recovered in the same manner in which penalties are by this Act made recoverable.

5. The owner or master of every ship carrying a cargo any part of which consists of petroleum to which this Act applies, on entering any harbour within the United Kingdom, shall give notice of the nature of such cargo to the harbour authority having jurisdiction over such harbour.

If such notice is not given the owner and master of such ship shall each incur a penalty not exceeding the sum of five hundred pounds, unless it is shown to the satisfaction of the court before which the case is tried that neither the owner nor the master knew the nature of the goods to which the proceedings relate, nor could with reasonable diligence have obtained such knowledge.

In spite of all precautions, accidents do take place. Every case has been thoroughly investigated by the authorities, and, as the result of many enquiries, the B.O.T. issued the following note :—

> The Board of Trade desire to impress upon those concerned the necessity of taking all necessary precautions when oil of any description is carried in bulk in double bottoms or other spaces in vessels not specially constructed for the carriage of oil in bulk.
>
> The necessary precautions depend upon the nature of the oil and the construction of the compartments in which it is carried, but in all cases every means must be taken to ensure that the tanks themselves, as well as all pipe connections, are oil-tight. The tanks should be carefully examined, internally and externally, before oil is carried in them, and tested periodically for watertightness under a sufficient pressure of water.
>
> When oil is carried in a double bottom compartment below a machinery space care should be taken to prevent the accumulation of coal dust or dirt on the inner bottom. The stokehold platform should be fitted with the necessary fenders, and should be so constructed that ashes or clinkers will not fall on the tank top when the fires are being worked or cleared. Oil having a flashpoint less than 150 deg. Fahr. close test should not be carried below a boiler room.
>
> When oil is carried in wooden barrels, the bulkheads and decks separating the compartments in which the barrels are stowed from the machinery spaces and bunkers must be watertight. (Nov., 1916).
>
> NOTICE TO OWNERS AND MASTERS OF PETROLEUM-CARRYING VESSELS.—The attention of owners and masters of petroleum-carrying vessels is directed to the great desirability of keeping the coffer dams on such vessels filled with water whenever the cargo, or part of the cargo, consists of petrol, naphtha, benzolene or similar products. It is also desirable that the same precaution should be adopted when the vessels are carrying cargoes of heavier qualities of oil in climates in which the average temperature of the air rises appreciably above the flashpoint of the oil.

The Board of Underwriters of New York, with which is incorporated the National Board of Marine Underwriters, have special regulations relative to the stowage of Petroleum or its products.

Tar and Tar Oils

Formerly, the by-product of the gasworks known as tar was considered as waste and discarded, but now it is possibly of more importance as a product of the distillation of coal than is the gas originally sought.

Tar is by far the most important of the raw materials used in the chemical industries ; and as the supply from the gasworks is no longer adequate, tar is now also obtained from the distillation of bituminous coal and of wood.

Tar and Tar Oils must be classed as **Dangerous Cargo** for one or other or all of the following reasons — inflammability, odour, poison.

They may be carried as a full cargo or as part of general cargo.

The oils should be contained in strong barrels or drums and must be handled with care. Barrels must be properly blocked off to prevent movement and collision. Each container must be carefully inspected, the compartment given adequate ventilation, and the cargo stowed well away from any foodstuffs.

The distillation of Coal Tar yields the following oils, so named on account of their specific gravities :

1. Light oils or Light Naphtha, which contains chiefly Benzene and Solvent Naphtha.
2. Middle Oils, which give Carbolic Oils and Naphthalene.
3. Heavy oils or Creosote Oil.
4. Anthracene Oil, from which is prepared Alizarin, the basis of numerous artificial dyes.
5. Pitch, which is treated with Heavy Oils to make " Tar," or enters the market as " Pitch."

The products of the distillation of wood-tar necessarily vary according to the kind of wood used. The most important product, especially when beech-wood is used, is Creosote—which must not be confused with the Creosote Oils obtained from Coal Tar. These oils are rich in cresols and are of great importance in the preparation of disinfectants, e.g. lysol.

Tar and its products are all highly inflammable. (Cf. Dangerous Cargoes, page 199).

The following articles of commerce directly associated with Tar might here be mentioned :

Aniline Oil. From the nitrobenzene of the light oils, aniline oil is obtained, which oil is the basis of the aniline dyestuffs.

Aniline is most frequently shipped, not as oil, but as **Aniline Salts**—a combination of Aniline with Hydrochloric Acid forming a crystalline salt which is far more convenient for carriage.

Barol. A brownish-black viscid oil prepared from Tar oil having antiseptic properties and used for preserving timber.

Carbolineum. A mixture of heavy coal-tar oils sometimes having a most unpleasant odour which is an excellent preservative for wood.

Goudron. A bye-product in the distillation of brown coal tar and also from the tarry residue in the refining of mineral oils. It is used for liquid asphaltery, for electrical insulation, and for painting damp walls.

The term " **Oils** " necessarily includes " **Fats** " and " **Waxes,**" especially so as many of the solids are liquids in the country of origin. If is therefore not out of place to here mention the mineral wax Ozokerite.

Ozokerite is a mineral of a waxy nature of various colours and degrees of hardness. The inferior kinds are used for the preparation of paraffin, while from the better samples is produced Ceresine, a name frequently given to Crude Ozokerite. Stowage as for Wax (q.v. page 102).

Ceresine is a substance of a beeswax nature used in the cotton and woollen manufactures, in soap-making and in perfumery, etc. Ceresine being a mixture of paraffins, is inflammable. Called also Fossil Wax. Securely packed in strong barrels or drums, the cargo should cause no anxiety, provided reasonable care is exercised in the selection of place of stowage. (Cf. Waxes, page 102).

Vegetable Oils. Vegetable oils are obtained by divers methods from various parts of plants. Vegetable oils will be carried in barrels and drums and should be treated in a manner similar to that observed in the case of mineral oils. Careful examination of the containers is at all times of the utmost importance and special precautions must be taken against leakage. Free oil is, of course, a source of damage to other cargo, and in this respect at least such merchandise must be considered " Dangerous Cargo."

For convenience, vegetable oils are divided into three groups, viz. **drying oils, non-drying oils, and essential oils.**

Drying Oils. as their name implies, are those oils which more or less readily dry on exposure to air. Such oils are extensively used in the manufacture of paints and varnishes ; some, however, which dry so slowly that they cannot be used in paints, are used in soap making and as lubricants.

The following list includes the more important vegetable drying oils :

- Candle-nut
- German Sesame
- Hemp
- Linseed
- Madia
- Nut (Walnut)
- Niger
- Pine
- Poppy
- Safflower
- Sunflower
- Wood

Non-drying oils are those which do not dry on exposure to air. These oils are largely used in food preparations, soap manufacture and in pharmacy, and for many other purposes.

The chief vegetable non-drying oils are :

- Almond
- Ben
- Castor
- Colza
- Cotton-seed
- Croton
- Ground-nut
- Maize
- Mustard
- Olive
- Rape
- Sesame or Gingelly

The **Essential or Volatile Oils** constitute a very extensive class of vegetable products, each of which possesses in a concentrated form the odour characteristic of the plant from which it is obtained.

Various methods are adopted to obtain these volatile oils, many of which are trade secrets. Essential oils are extensively used in perfumery and in pharmacy. Some are of great importance in the arts and manufactures, and in a modified form very many are used as flavouring materials. Essential oils are inflammable liquids, and their solutions even more so, as the oils are dissolved in alcohol, ether or fatty oils.

Apart from the oil of Turpentine, commerce in essential oils is limited as regards bulk, although the value of the various articles is considerable. Essential oils are packed in various ways, usually to suit the purchaser's requirements. The most convenient package, and therefore the most common, is a drum weighing from 1 to 8 cwt. When the quantity is less than 1 cwt, the oils are usually shipped in tins and cases. Further, some oils, especially oil of Lemon and Bergamot, are bought on brand, and these oils are shipped either in tins or in coppers of 7, 14 or 28 lb. packed in cases.

Still smaller quantities would be contained in bottles securely packed in hermetically sealed tin-lined cases. The responsibility for efficient packing rests with the shippers, and all cargo must be plainly marked.

Remembering the valuable nature of the merchandise, all cargoes of essential oils must be very carefully handled and securely stowed. These oils pay high freight and require special consideration.

As the oils are inflammable, special precautions must be taken against risk of fire.

Although essential oils are a source of danger to other cargo by reason of their strong odours, the efficient packing should cause no anxiety in this respect; but in view of possible accident, cargoes of essential oils must not be stowed in proximity to other articles such as tea, tobacco, and foodstuffs.

The following list includes the majority of essential oils ordinarily met with in commerce:

Aniseed
Australian Sassafras
Bay
Bergamot
Bitter Almonds
Cajuput
Carraway
Cassia
Cedar
Cedrat
Cinnamon
Citronella
Cloves
Copaiba
Eucalyptus
Fennel
Garlic
Ginger
Indian Geranium
Jasmine
Juniper
Lavender
Lemon
Lemon-grass
Limes
Marjoram
Mint
Mustard
Myrrh
Myrtle
Neroli
Nutmeg
Orange-peel
Patchouli
Pennyroyal
Peppermint
Petitgrain
Pimento
Rose
Rosemary
Rosewood
Rue
Sage
Sandalwood
Sassafras
Savin
Spearmint
Spike
Star Anise
Thyme
Turpentine
Valerian
Verbena
Wintergreen (Gantheria)
Wormwood

Attar of Roses (a solid)

Vegetable Fats

Vegetable fats are shipped in large quantities for use especially in soap and candle manufacture. Some of these fats are used in the preparation of artificial "butter," and many are used in pharmacy and in the making of pomades.

The containers for vegetable fats and waxes should be drums or strong casks. These containers must be carefully inspected, as the fat and wax may become oil during transit, and a faulty container would mean leakage. The place of stowage should be as cool as possible, and away from any cargo likely to be damaged by possible leakage.

The more important are:

Avocado Oil
Bayberry Oil
Carapa Oil (Orba-wood)
Chinese Vegetable Tallow
Cacao Butter
Coconut Oil
Ghee Butter
Macassar Oil
Mahwa Butter
Oil of Mace (Nutmeg)
Palm Oil
Palm Seed Oil
Piney Tallow
Shea Butter

Of the **Vegetable Waxes** the most important is Japanese wax (q.v. under Waxes, page 102).

Animal Oils

The oils of animal origin are principally obtained from marine animals and fish; but domestic animals and insects do produce a few. Some articles bear names which suggest animal origin, but very little if any of the commodity under such name is obtained from the source to which it is attributed, e.g. Bear's grease.

The packing and stowage of Animal Oils will be carried out in a manner similar to that for the Vegetable products, with the additional precaution that the Animal Oils may be a further source of trouble in consequence of the strong odours associated with them. Hence stowage must be well removed from other merchandise liable to be damaged by taint.

The following list includes the chief animal oils and their application:

Neat's-Foot Oil. A non-drying oil used as a lubricant in delicate machinery.

Seal Oil. Used for burning, lubricating, and in the leather industry.

Porpoise Oil (Bottle Nose Oil). Used for burning, lubricating, and in fibre dressing.

Sperm Oil. Used as a lubricant.

Whale Oil. A burning oil and a lubricant.

Cod.
Shark. } Used medicinally and in the leather industry.

Fish Oil. Used for burning or as a lubricant, the most important being Menhaden Oil.

Animal Fats

Under this heading are included prominent foodstuffs and materials used in the manufacture of soap and candles.

Lard, Butter, Tallow, etc.; all of which are included under their respective headings in Chapter II.

Animal Waxes

Beeswax, Insect Wax, Spermaceti, etc., all of which are included under their respective headings in Chapter II.

Provided the containers for the fats and waxes are sound, and remembering that fats and waxes may become fluid during transport, the stowage of the above animal products should cause no inconvenience.

Turpentine

Turpentine is a resin obtained from the pine tree and is usually known as Common Turpentine. Venetian or Venice Turpentine is a finer kind which is obtained from the larch.

There is also an artificial turpentine. From this resin is distilled the Essential "Oil of Turpentine."

The so-called pine-wood oil is practically the same as turpentine oil.

Turpentine is an inflammable oil extensively used in the manufacture of paints and varnishes and as a solvent for resins, fats, rubber, etc.

Turpentine has the power to absorb from the air oxygen which it may subsequently give up. It is therefore used in the manufacture of disinfectants and antiseptics such as "Sanitas," which is a solution of oxygenated turpentine in water.

Turpentine is a "dangerous cargo" because of its inflammability and pungent odour.

It is shipped very largely from the Gulf Ports, and from the East coast of U.S.A. especially from Savannah, Jacksonville, Brunswick, etc., in cargoes of what are usually described as "naval stores," consisting of turpentine, resin, and lumber.

Great care is necessary in the stowage of a consignment of turpentine.

There is great diversity of opinion as to the maximum number of heights of casks which should be allowed in the hold. Our opinion is that this depends entirely on the quality of the casks, which varies considerably; and also on the manner in which they are stowed. The bottom tier should be carefully bedded on two beds in order that the bilge may be clear of the floor and well chocked. The ground tier should not be allowed to ride on any projecting frame, stringer or angle, but should be kept well clear on the side, the space filled up with cordwood, and securely blocked off to prevent the slightest movement. After the first tier is laid we favour what is now termed "solid stowage," that is bilge and cantline stowed half cask. By this means each cask rests on four casks beneath it; but the greatest care must be taken to see the heads are absolutely perpendicular, otherwise shifted heads will be the result. In all cases it is necessary to see that the chimes of the side casks do not rest on any beams, angles, etc.

In stowing turpentine with resin and lumber, the turpentine should not be stowed on top of lumber, unless this is packed absolutely solid and floored over with athwartship boards, otherwise the lumber is liable to spread and cause slackness amongst the casks which is fatal to good stowage. We do not recommend that the turpentine should be stowed on any prime lumber, such as is usually shipped from the above-mentioned ports, as in the event of any leakage of turpentine, it stains the lumber and many heavy claims have resulted—it being alleged by the furniture manufacturers that it prevents the glueing of this wood. Needless to say, with a ship carrying turpentine special precautions should be taken against fire. Ventilation should be properly attended to, as it has been found at times impossible to continue working in the hold owing to the gas from leaky barrels. No other cargo that is liable to be effected by the very strong odour should be stowed in a hold with turps.

Camphor Oil. Camphor oil is distilled from a forest tree of Japan, Formosa, and China. The normal oil is in a semi-solid state, owing to the excess of camphor. When this excess is removed the liquid portion is the "Camphor Oil" of commerce.

Camphor is a colourless crystalline mass of characteristic odour and highly inflammable. Much of the camphor of commerce is made from Oil of Turpentine.

Camphor Oil should be shipped in drums and stowed as an Essential Oil. **Camphor is a "Dangerous Cargo." It** should be packed in hermetically sealed tins in strong cases and stowed away from heat and other cargo.

Fusel Oil. A by-product of alcoholic fermentation causing the "fiery" taste to spirituous liquors. It is a mixture of alcohols and should be treated as Alcohol. (See page 194.)

Lard Oil. Various products are known by this name. It is also called Bacon Oil and used to make soaps, pomades and lubricants. An oil obtained from rape seed oil is also called lard oil and is an excellent lubricant. Stowage as for animal oil. (See page 145.)

Leather Oils. The fat is obtained in tanning chamois leather, and consists of oxidised oil. It is properly called **Degras** (Tanning Grease, Leather Grease). The demand for Degras is greater than the supply, and hence inferior skins are subjected to chamois dressing and the "grease" marketed as Degras, Moellen or Chamois-Moellen. Stowage as for animal oils and fats.

Isol. An oil used in oiling textiles.

Carron Oil. This is of much value for burns and scalds and is a mixture of linseed oil and limewater. Stowage as for linseed oil (q.v., page 143).

N.B.—It should be noted that many substances are called by the name "oil," but are not oils at all ; e.g. oil of vitriol.

OIL DEFINITIONS

Dangerous Oil is oil having a Flash Point of 23° C. (73½° F.) or below.

Ordinary Oil is oil having a Flash Point between 23° C. and 65° C. (73½° F–149° F).

Non-dangerous Oil is Oil having a Flash Point above 65° C (149° F).

ORES AND MINERALS

Ore is the name applied to a mineral from which a metal is to be extracted, whereas Mineral is the general name given to the rocks which compose the earth's crust.

For example, nitre is ore of the metal potassium, or the mineral from which nitric acid is made.

Ores and minerals will in general be carried in bulk and in bags. In a few special cases where the quantity would be small or of especial value the ore would be carried in cases ; such cargoes would be minerals associated with the rare or precious elements and of very high commercial value. These would require special stowage in a safe place.

The carriage of ore in bulk as a whole cargo requires special consideration, due regard being given to the stability and trim of the vessel and to the distribution of weight over her structure.

In former times it was usual to talk about the carriage of ore in trunkways, but this now is a thing of the past. At the same time it is still advisable to keep the cargo fairly high to make the vessel as easy as possible. The shape of vessels has so altered in recent years, however, especially on the introduction of flat-bottomed vessels, that this method of keeping the cargo high is giving way to what is termed "winging out" of weights.

In past years it was the practice to put nearly all the weight in the hatches amidships, leaving the end hatches empty. In our view this practice was entirely wrong, and undoubtedly the modern lightly constructed steel vessel has in many cases suffered through such stowage.

We certainly think that it is advisable to keep perhaps the major portion of the cargo in the middle hatches, but still a reasonable quantity should be loaded in the ends. This should be piled against the bulkhead on the after part of the forehold and the fore part of the after hold as illustrated in Fig. 23.

Ore should not require much trimming ; of course with some light ores a certain amount of trimming is necessary, but with the majority, e.g. iron or copper ore, it is sufficient just to take the peak off the heap in the hold, and perhaps trim a little out in the wings to prevent it shifting, although one seldom hears of any such occurrence with a cargo of ore.

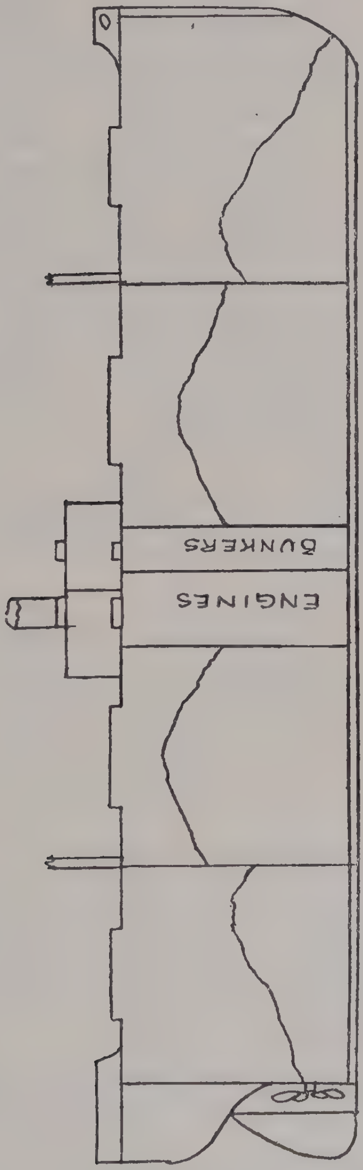


Fig. 23
Bulk Ore Stowage

The following list gives the ores and minerals more frequently carried. Many of them will be found described under their respective headings in Chapter II :

Apatite
Bauxite
Boracite
Calamine
Calkspar
Carnallite
Celestine
Chrome Iron Ore
Cinnabar
Cobalt Glance
Copper Pyrites
Corundum
Cryolite
Dolomite
Felspar
Fluorspar
Galena
Gypsum
Hæmatite (Red and Brown)
Heavy Spar (Barytes and Cawk)
Kainite
Keiserite
Kupfernickel
Magnesite
Magnetic Iron Ore
Malachite
Mispickel
Molybdenthe
Orpiment
Pitch Blende
Pyrites (Mundic)
Quartz
Realgar
Rock Crystal
Silicates
Spathic Iron Ore
Specular Iron Ore
Stibnite
Tantalite
Thorite
Tincal
Tinstone
Witherite
Wolfram

The following list of mineral products may be found useful. The majority are largely carried and will be found included under their respective headings in Chapter II :

Barilla
Bluestone
Bone Ash
Chili Saltpetre
Chinese White
Copperas
Epsom Salts
Green Vitriol
Hypo
Minium
Nitre Saltpetre
Pearl Ash
Plaster of Paris
Potashes
Red Lead
Rock Salt
Sal Ammoniac
White Lead
White Vitriol

PRECIOUS CARGO

This includes such articles as gold and silver specie, precious stones, mails, etc., and is usually carried nowadays by special agreement only, that is to say on a percentage based on the declared value, and must be carried in a strong room, or other " lock up " accommodation.

In mail steamers that frequently carry large quantities of bullion special arrangements are usually made, and every ship or company so doing has its own methods of dealing with this type of cargo.

Cases containing bullion should always be worked with nets specially constructed for this purpose, and each net should be fitted with a buoy rope long enough to reach the bottom of the dock, or place where the vessel is lying, in case of accident. This buoy rope must be rove round the edge of the net, and spliced with an eye splice around its own part. It is obvious that should an accident occur when hoisting a net of bullion on board, and the fall break and allows the contents to sink in the water, if the buoy rope was not rove as described, the net would open under water. Whereas if so fitted and a strain be put on the buoy rope the net would close.

All receipts given for packages of this description should be worded " said to value " or " said to contain," and should not be signed for any particular value unless the person receiving them has an opportunity for checking. It is usual to sign receipts " contents and value unknown," as no one receiving these packages can say what they actually contain without seeing inside. It is of great importance, however, to see that the seals and coverings are perfectly intact, and when delivering such goods care must be taken to see that the receipts are marked " seals and packages in perfect order and condition ; marks and numbers as per receipt." This should always be insisted upon.

Mails. Mail bags may be carried by contract or otherwise. Such cargo must be considered as " precious," and great care must be taken to see that it is well stowed in a place where it will receive no damage from wet or vermin, and in a compartment (preferably a " lock up ") where there is least risk of any of the packages being pilfered. Mail should be ready to be discharged immediately on arrival, so that undue delay in delivery is avoided.

REFRIGERATED CARGO

By refrigeration is meant the application of cold to preserve goods, especially food produce, which process of late years has been increasingly used, and nowadays many vessels are specially fitted for this purpose.

There are various grades of refrigeration. For instance all the Argentine beef is carried home in a " chilled " condition. Meat and butter from Australia and New Zealand are actually frozen before shipment, and kept in this condition during the voyage ; whilst cheese, eggs, apples, pears, oranges, etc., are carried at any required temperature that experience has shown will result in the particular commodity turning out in the best possible condition.

There are two ways of utilising cold for refrigeration purposes in a ship. In all cases the holds or decks are insulated throughout, charcoal and silicate of cotton being largely used for this purpose. In the " air blast " system trunks are laid in the holds and decks, through which cold air is blown all round and through the cargo by special machinery. The trunks are fitted with small sliding doors worked from inside, and these are opened or closed during the voyage according to which part of the hold requires more or less cold air.

In the "brine" process, pipes are fitted round the hold or deck inside the insulation and up underneath the deck head. When the cargo is loaded, portable hatch grids are fitted in the hatch square and connected up, and then cold brine is pumped right round the cargo throughout the voyage.

In all cases thermometers are laid in tubes down through the cargo in various parts of the hold, and if these are sighted regularly any rise of temperature can be at once seen. It is advisable to have these double, i.e. one low down, and one high up in the hold.

In different trades there are different regulations, and each company has its own rules, but the following are general notes that should be observed.

Before any refrigerated cargo is shipped the holds must be carefully cleaned and prepared. The main idea with all cargo of this nature is to keep a space right round the cargo to allow a free flow of air. To accomplish this, wooden battens are nailed at intervals round inside the insulation and on the ceiling of the hold before loading. These battens must be clean and properly laid at the fixed intervals, and should have their edges chamfered when used beneath meat.

Before loading, the compartments must be pre-cooled to the desired temperature, and from then until the cargo is discharged this must never be allowed to rise above the point where the cargo will become damaged.

When carrying a "frozen cargo" care must be taken that the ventilators are effectively plugged up, as neglect of this precaution has sometimes been the cause of serious cargo damage.

Cargo must not be stowed tight up under the deck head, as this will not allow a free air space above it. This air space is specially necessary with cargo such as butter and cheese, as these cases and crates will not sink so much with the working of the ship as bagged or loose meat and offal will do.

In some vessels in the Colonial Trade a quantity of lead or copper ingots, or other suitable goods, are sometimes loaded in insulated lower holds for stability purposes. Great care should be exercised to see that these are effectively battened to prevent any meat touching them, and also sufficient time must be given in pre-cooling these holds to allow the cold air to thoroughly cool the whole of these goods.

In "brine" vessels, through having the hatches open for long periods during loading, snow sometimes forms on the pipes, and care should be taken to see that any of this which may fall on such articles as fruit or eggs is removed before it melts, as otherwise it may badly damage the article by wet.

The greatest caution should be exercised during loading to see that the cargo is shipped in good condition and that all the goods are at a correct temperature. It is of course not possible to examine every carcase or case, but a sample from every truck or barge should be inspected. The average vessel should deliver cargo at about the same temperature at which it was received but it is seldom possible to reduce it very much.

Frozen Meat

Under this heading come mutton and lamb, beef in quarters and bags, pigs, offal, veal, rabbits, etc., etc.

All meat should be examined to see that it is hard and in good condition. With mutton and lamb the carcases must be covered with clean cloths, and care used to see that shanks are unbroken.

A great number of small pieces of beef in bags are now carried, and these have given rise to a lot of trouble. They should be specially examined to test their hardness by sticking a pricker in the meat. With these bags, as they sink so much, to ensure a free circulation of air underneath the cargo, if stowed in a lower hold it is advisable to use double battens, one line athwart and one fore and aft. The bags should then be laid in the opposite direction to the top line of battens. It is customary, and to be recommended, to lay battens between every few tiers of bags, to allow a circulation of air throughout. These battens should be in the hold when the cooling takes place before starting to load, as otherwise they may damage the bags. Before over-stowing bagged beef with any other cargo, a tier of battens must be laid.

Loading quarters and bags of beef together in a hold, the quarters should of course be loaded on the ceiling to save the double battens; and to save further space, tiers of quarters and bags may be loaded alternately.

Mutton and lamb should be stowed fore and aft, and back to front, so that the carcases fit. The flanks must on no account be stowed against a flat surface, as this will cause the carcase to go bad and ruin many more. Loading on the floor of a hold must be watched carefully. Cases have occurred of a tier of lambs being stowed fore and aft against a bulkhead by incompetent stevedores, and a lamb laid athwart between the battens to keep the ends of the carcases up level. If this had passed unnoticed great damage would have been done by stopping the air circulation.

Beef must not be stowed on top of mutton or pigs, but floor space should be found for quarters unless being carried with butter, on which it may be stowed provided the butter is covered with a tier of battens.

From some ports pigs are being carried in cold storage in increasing quantities, and the same care should be given to their stowage and handling as to mutton, as although they are usually shipped in hessian covers, they are very easily crushed. If necessary to stow lamb and mutton in the same compartment as pigs, the pigs, being heavier, should be stowed first.

Rabbits are shipped in crates and should be stowed on their sides, and are best carried with thin laths placed athwart every few tiers. Before over-stowing with any other cargo, battens must be laid on top of the crates.

Chilled Beef

Many vessels nowadays are especially constructed for the carriage of beef in a "chilled" condition. They are fitted in the holds with brine pipes, and underneath the decks, rails are fitted for the fores and hinds to hang by chains. In the various tween decks only one height of beef is usually "hung," but sometimes one tier of beef is laid flat on the deck itself on dunnage, if the deck is of sufficient height.

In the lower holds three or even more heights are hung from the deck by chains of varying lengths—fores usually being hung amidships, and the hinds more often in the wings. When the holds and decks are filled to the hatch square, bars are laid across between the beams to hang the final quarters on, and the grids are fitted in place, the whole making close stowage. Care should be taken to see that sufficient air space is left underneath the beef in all cases.

Butter

This must be stowed in a block by itself, preferably in the bottom of the hold or deck, the floor battens being placed at regular intervals, far enough apart to take both ends of the case.

When a full compartment of butter is carried it is often stowed solid, but this is not to be recommended, as if a few cases of soft butter are loaded in the centre of the hold they may possibly be in a bad condition when discharged, through lack of air circulation.

Thin laths should be laid between the boxes every few tiers to ensure a good circulation of air throughout the cargo.

Before over-stowing butter with any other cargo, always lay a tier of battens on top of the boxes.

Butter will easily absorb taint from fruit, so on no account must they be stowed in the same compartment.

Eggs

These are packed in cases, which should be handled in trays, and every care taken to prevent the eggs being broken They should always be stowed, if possible, by themselves in a tween deck, and not with fruit, or in a deck over a lower hold containing fruit, as they quickly absorb some taints.

The usual temperature in which it is advisable to carry eggs is about 35° Far. and not below this, as eggs must on no account be allowed to freeze.

Cheese

Is mostly carried in crates containing two or more cheeses. The crates should be stowed fore and aft on 1″ boarding laid on top of the floor battens. The temperature at which it is usually carried is round about 40° F. It should be remembered that cheese gives off gas, and when hatches are opened for discharge the gas should be displaced (if not done previously), before men enter the hold.

When cheese is carried in a deck in any proximity to frozen cargo, great care should be taken by using sufficient insulation, such as sawdust, to absorb the condensation, and the scuppers must be closed to prevent air entering the cheese compartment.

REFRIGERATED FRUIT

Of late years an increasing number of different fruits have been carried on long voyages in cold storage. Apples and bananas are carried in very large quantities, and have been given special consideration in this chapter.

The carriage of fruit is really only in its infancy as far as refrigeration is concerned, and no rigid rules can be laid down at the present time regarding its carriage.

South Africa has for some time been exporting large quantities of fruit; **Grapes, Pears, Melons and Peaches** have been successfully carried at a temperature of about 33° Far.

Pineapples, Apricots and Plums have also been carried. In the case of the two latter they were separately wrapped in paper packed in woodwool in cases.

Pears may be carried under the same conditions as for Apples (v. seq). **Oranges** are carried at a somewhat higher temperature—about 40° F.

Fruit, such as Apples, Pears and Oranges, give off a large quantity of gas, and this should be displaced daily by ventilation to prevent any possibility of it tainting other refrigerated cargo. The higher the temperature the more gas is given off.

Apples

The temperature usually aimed at in carrying apples is about 33° F. Variations of temperature should be avoided, as this causes rapid deterioration. Apples freeze at 29° F. Freezing does not appear to injure the fruit, provided the thawing off is done very gradually.

In all cases the fruit must be in good condition and not in any way "soft." The cases should be carefully scrutinised and some fruit cut open for examination. Frequently apples will be found to be affected with "Brown heart" or "Bitter pit." These should be rejected, as also should any over-ripe fruit.

As apples are generally shipped in a warm condition, proper ventilation with this cargo is essential, and should be obtained by placing laths and battens between the cases to ensure a free passage of air through and around the entire cargo.

It is of the greatest importance, especially in "grid ships," to leave vertical air spaces between the cases to allow the cold air to circulate in a vertical direction—its natural tendency.

If apples have at any time been at too high a temperature, a syrup is formed on the surface, which causes stickiness and softening of the skin, which materially affects market value.

The odour from apples taints flour to a great extent.

The paper in which apples are wrapped is chemically prepared, so that the injurious acids given off in the process of decomposition will be neutralised. These papers should be kept dry, as if allowed to get wet by rain or otherwise, they may seriously damage the fruit. Owing to the paper being specially prepared, however, a rotten apple has not much effect on others in close contact with it.

The rules (v.seq.). of the Board of Marine Underwriters, Seattle, will show what is necessary when loading apples on the Pacific Coast of U.S.A. Vessels loading in Australia and New Zealand usually have special company's rules of their own.

RULES FOR LOADING APPLES.

BOARD OF MARINE UNDERWRITERS, SAN FRANCISCO SEATTLE OFFICE.

Lower Holds.

First Tier 3 × 3 or 2 × 4 inch Dunnage to be laid athwartships on floor of hold, and so placed to take the weight of such box just under the ends.

Boxes to be stowed on the sides with the rounded top of the box against the bottom of adjoining box.

The 2nd, 3rd, 4th and 5th tiers to be separated by one inch dunnage, either 1 × 2 inch, 1 × 3 inch or 1 × 4 inch, but not any wider and the boxes stowed as on the first tier.

Sixth tier to be separated by 3 × 3 inch, or 2 × 4 inch dunnage placed under the ends of the boxes, as in the first tier.

The placing of the 3 × 3 inch or the 2 × 4 inch dunnage between the fifth tier is to allow larger circulation of air and to distribute the weight.

Seventh tier to be separated by 1 inch dunnage and so on upwards, placing a 3 × 3 or a 2 × 4 between each fifth tier.

Dunnage to be of long lengths and none to be used with any rotten spots.

No piece to be shorter than will go across six boxes should be used. This is to prevent any excess weight getting on one.

Short pieces covering one or two boxes not to be used at any time or place.

Boxes to be stowed out to the side of the ship allowing a space from three to ten inches from the side of the ship as directed by the surveyor according to the type of ship.

Brine ships 10 inches to avoid any possibility of freezing the apples, adjacent to the pipes.

On cold air ships 3 inches will be sufficient.

Tween Decks.

3 × 3 inch or 2 × 4 inch dunnage to be laid on the deck for the first tier 1 inch dunnage to be used for the following tier.

No other 3 × 3 inch or 2 × 4 inch dunnage need be used in the tween decks except in the bottom tier.

After the first tier of boxes are laid in the lower holds sufficient 1 × 12 inch boards are to be laid in square of hatch to land the loads.

Other 1 × 12 inch boards are to be laid for the longshoremen to walk on.

The men are to be cautioned against walking or stepping on the sides of the boxes and bruising the apples.

No loading to be done in either light or heavy rain unless proper hatch tents are provided on the ship, and deck tents from the shed to the ship's side are used.

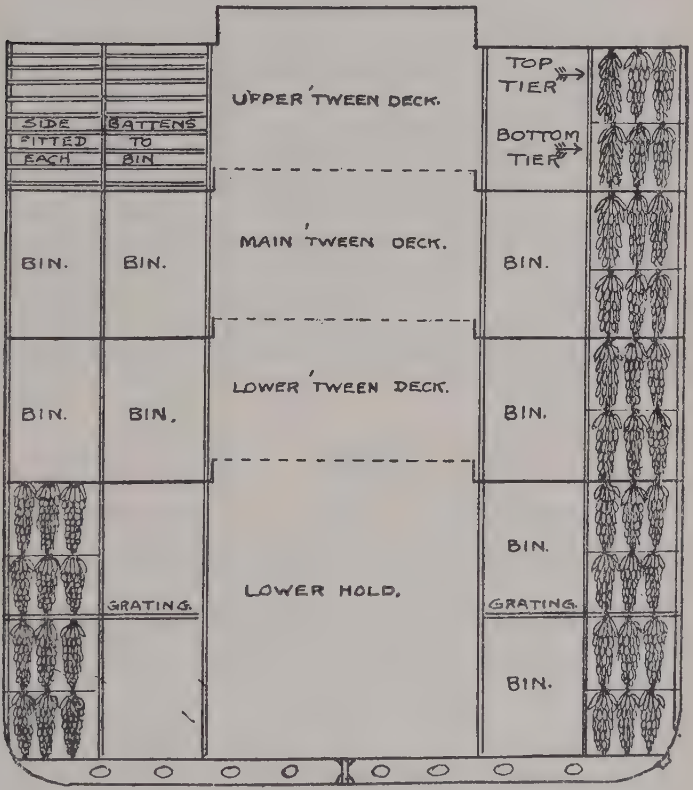
If apples are loaded in light or heavy rain the paper in which the apples are wrapped gets wet, which is liable to rot the apples.

Seattle,
Washington.
Nov. 1st, 1922.

Bananas

The carriage of bananas is practically confined to one or two companies who have specialised in this trade, and they have had their vessels fitted up in accordance with the result of past experience.

The ships are usually "cold air" ships, the air being blown through the holds in trunks at a temperature of 50°F to 60°F, and withdrawn by fans. The air is changed at intervals, so that the air in circulation is not tainted to excess. The bananas are cut from the trees in bunches when they are in a very green state, their condition at the time of cutting being taken into consideration with the speed of the vessel, and the distance between the place of loading and the port of discharge.



SIDE FITTED EACH
BATTENS TO BIN
UPPER 'TWEEN DECK.
TOP TIER
BOTTOM TIER
MAIN 'TWEEN DECK.
BIN.
BIN.
BIN.
LOWER 'TWEEN DECK.
BIN.
BIN.
BIN.
BIN.
LOWER HOLD.
GRATING.
GRATING.
BIN.

Fig. 24

Banana Carriage in Specially Constructed Vessels

At some ports in the West Indies the bananas are packed in crates or cardboard drums, but the most common method is to load them without any package, just as they are on the stem.

A cargo is spoken of as so many "stems," but this term cannot be taken as a standard, as the size varies according to the type of the banana, also the bananas grown on one island differ from those grown on another.

As many bananas as possible are carried without damaging the fruit by crushing. Each deck is divided up into what are known as "bins." (See Fig. 24). Permanent uprights are fitted at about 10 feet intervals both fore and aft and athwartships from deck to deck.

The sides of these are slotted to take portable battens, whilst the deck is fitted with portable gratings about 3 inches deep. A "bin" is about 10 ft. square, with the battens forming the sides, and the grating forming the bottom. The average deck carries about 2 heights of bananas, which are stowed on their ends. Two heights just leaves sufficient air space from the deck head.

In the lower holds when two heights have been stowed, heavy carlings or battens are fitted in the uprights, then gratings laid; and then another two heights of bananas are stowed, or sometimes three—according to the class of banana. This method prevents any crushed or misshapen fruit. When a hold is completed, the hatches are sealed with insulated plug hatches. When loading is commenced it is started in the lower hold in the wings, and as each "bin" is filled, the side battens are replaced, which forms another "bin" and so on.

The temperature of the holds is regulated according to the requirements as regards the condition of the fruit, which requirements are governed by the distance or the time necessary to reach the desired market.

RICE

At the present time the bulk of the rice is shipped from Burmese ports (the principal of which is Rangoon), from Siam, Cochin China, and considerable quantities are also shipped from Calcutta and other ports.

New rice is usually shipped mixed with a proportion of husk or paddy to the extent of 10-20% and 80-90% rice, and in this condition is termed "Cargo Rice."

The method of stowing rice is similar to stowing any other cereal which is carried in bags, except that, owing to the large percentage of water contained in Rice and its liability to sweat, greater care must be taken as regards stowage and ventilation.

In stowing a cargo of rice, it is essential to see that the holds are perfectly clean and well dried, and that there is no water remaining in corners of stringers, etc., or in the bilges. Floors should be well dunnaged, but the dunnage should not be laid too close together, so as to admit of a passage of air between the pieces of wood.

Great care is necessary when taking on board bamboos, dunnage, mats, etc. for a rice cargo. Bamboos are often brought down in rafts, and after lying in the sun for a few days are placed on board for dunnage. While they may appear dry on casual observation, in reality they may be very wet, and not in a fit condition for use with a cargo of rice, therefore care should be exercised when receiving them.

The same precaution should be taken to see that the mats are perfectly dry, and no **rush** or **grass** mats should be used; nothing but dry bamboo mats. All stanchions, etc., should be covered with soft bamboo mats.

The usual method employed with rice is to tie bamboos (or sticks in some ports) to the wooden cargo battens, in lattice fashion. This not only prevents the cargo from touching the skin of the ship, but also admits of a free passage of air between the cargo and the shell plating. Bulkheads should be treated in the same manner.

The holds are usually matted throughout, and while it is the recognised custom to cover the whole inside of the vessel with mats, from practical experience our opinion is that so long as there is plenty of bamboo to keep the bags well away from the ship's sides, it is an advantage to leave certain places in the side free from mats.

Wooden ventilators are also used in the body of the cargo to allow a through passage of air. These are composed of two boards joined together with connecting pieces diagonal between them as illustrated in Fig. 25.

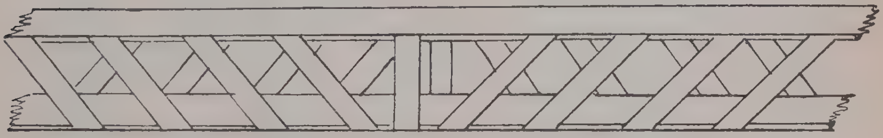


Fig. 25

Rice—Section of Wooden Ventilator

In Burmese ports these cargoes are loaded under the supervision of surveyors, and the system of loading generally adopted is as follows:—After dunnaging and matting the floors, bags are stowed in tiers fore and aft until about 5 or 6 tiers have been loaded in the bottom of the ship. Then a tier of wooden ventilators is laid fore and aft at regular intervals, depending on the beam of the ship, and others are laid athwartships at right angles to them intersecting the fore and aft ones, these all opening into one another—as depicted in Fig. 26. Then others are placed vertically, resting on the point where the fore and aft and athwartship ventilators cross, carried up to underneath the deck and led, either to the ship's main ventilators, or to the hatch coaming, at each corner of which a larger sized ventilator is brought up from the bottom of the hold.

Athwartship ventilators should be taken right out to the ship's side so as to admit of a passage of air right through the cargo. (See Fig. 27.) After this tier of ventilators has been completed, so many more tiers of bags are put in, and then the same process repeated. Before filling the hatch coamings it is a good plan to cut several short pieces of ventilator, and stand them round the coaming to allow the warm air to rise from under the deck, when hatches are opened for ventilation. The underside of the deck should be well matted. The general system of ventilation is shown in Fig. 28.

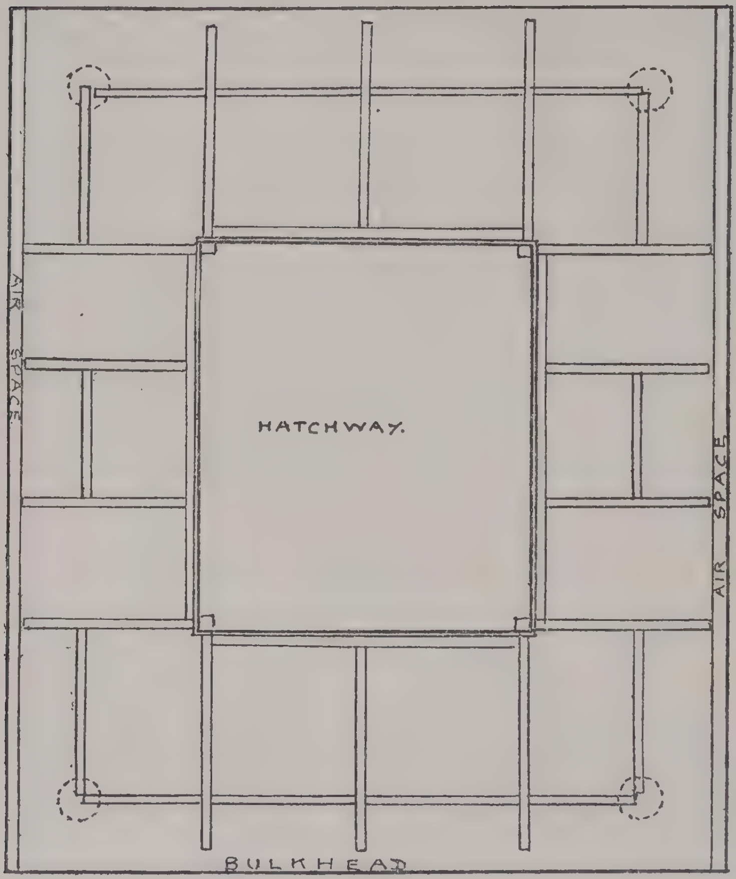


Fig. 26
Rice—Plan of Ventilation

The number of tiers of bags between each layer of ventilators depends on the season of the year, and the condition of the rice, and other circumstances connected with the vessel itself. These factors must be taken into consideration at the time of loading, and as ships differ so much as far as capacity and ventilation are concerned, it is impossible to lay down any special rule which will apply to every ship.

There is a great difference of opinion as to how the deck ventilators should be operated when at sea with a rice cargo. Some contend that the lee ventilator should be kept face to wind, and the weather ventilator the reverse, but after many years of experience we favour the method of keeping the cowls of **all** ventilators trimmed **back** to wind. This in our opinion gives opportunity for the **hot** air to rise as required, without forcing **cold** air down into the cargo, which only causes further condensation.

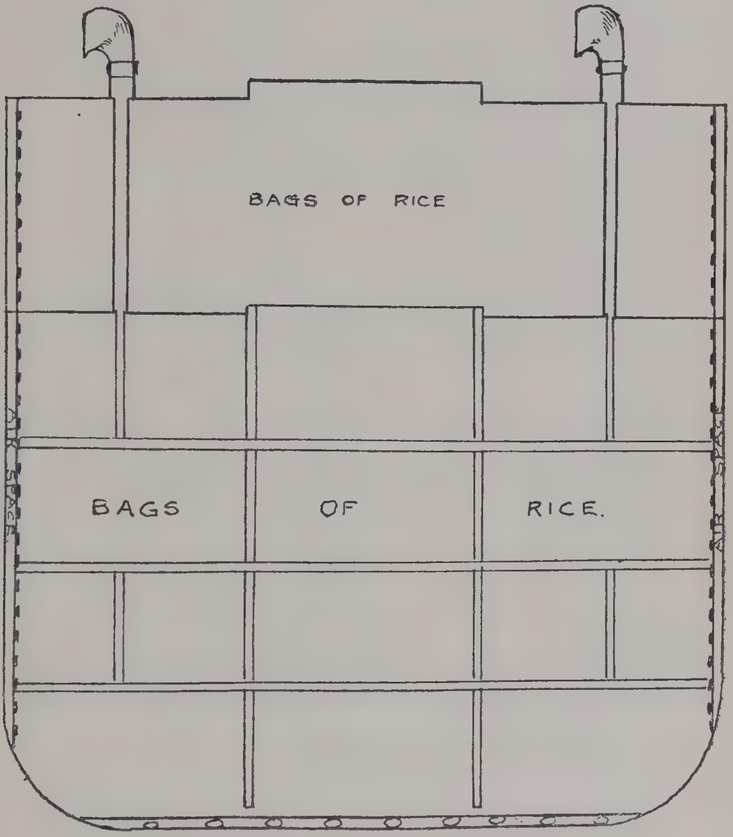


FIG. 27
RICE—ELEVATION OF VENTILATION

In the past, rice was carried in full cargoes in both sailing ships and steamers, and it is still so carried in cargo vessels, especially during the season from January to April. At other periods, owing to the increased size of steamers, it is generally carried in the regular lines in more or less large parcels as White Rice with other cargo, such as Rice Meal, Bran, etc., in which case it is stowed as ordinary bag cargo, but care must be taken that no goods likely to contaminate it are stowed in the same hold or compartment.

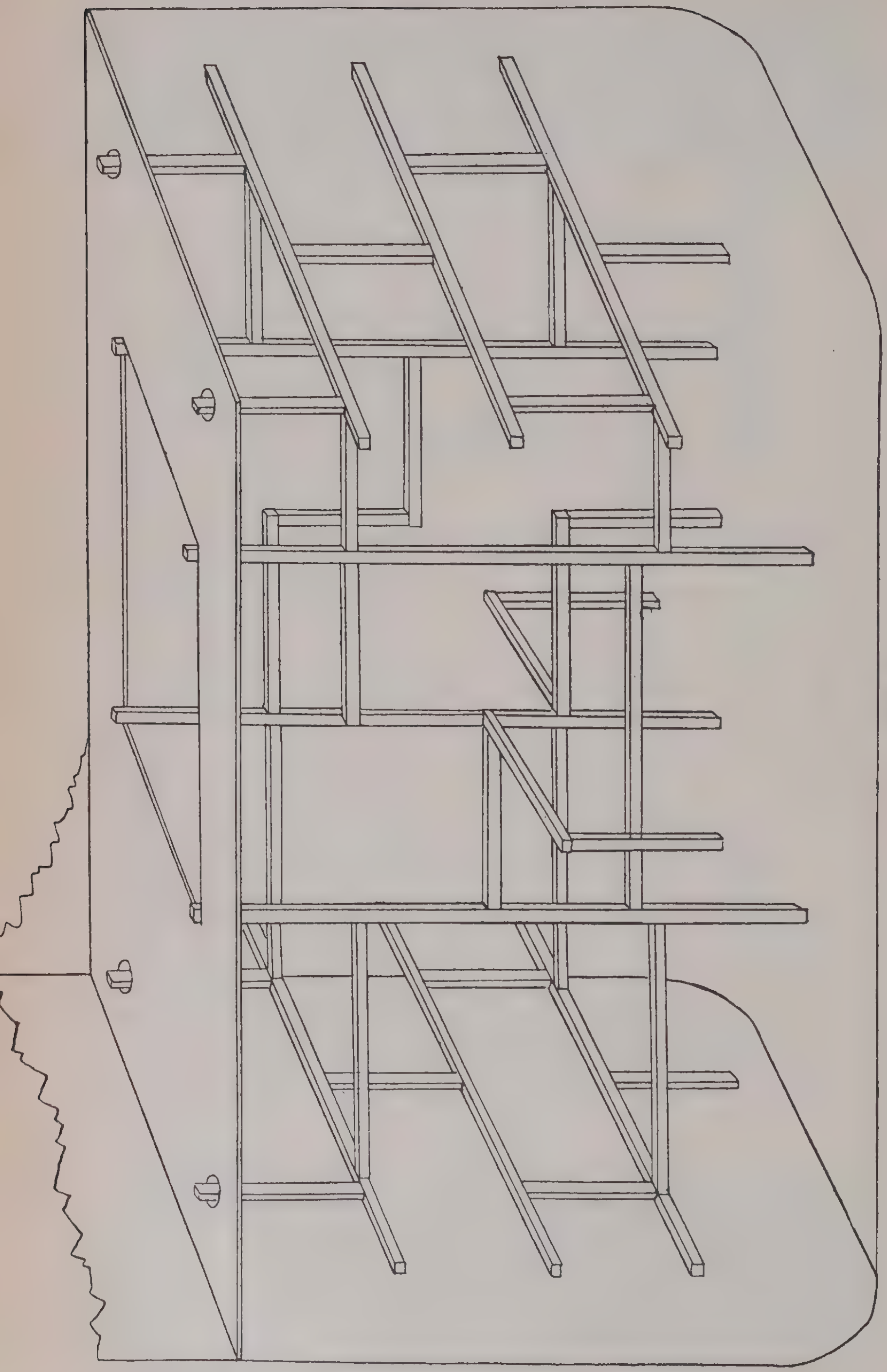


Fig. 28

Rice—Showing part of a General System of Ventilation with Vessel's Side Removed

SUGAR

Sugar in former times was usually shipped from the country of origin in its raw, or semi-raw state in the form of jaggery or wet sugar in mats and other packing, and unrefined dry sugar in baskets. Of late years, however, it is universally carried in bags in a semi-refined or refined condition, and beet sugar generally in a finished state ready for consumption.

If carried in parcels or small consignments amongst other cargoes, it is essential to see that it is not stowed near cargo that will damage it by taint or otherwise. A good clean place should be selected, well dunnaged, all ironwork matted or covered with burlap, and stowage given as for ordinary bag cargo.

Refined sugar requires very careful handling; no hooks must be used on any account and bags must be kept absolutely clean, as the slightest stain on the bag caused by, say, the use of a dirty sling will often render it unsaleable. When working refined sugar the square of the hatch should be kept clean, so that any loose from broken bags may be collected in a clean condition.

Full cargoes of raw sugar in bags require no special stowage, but holds must be cleaned and all traces of any dirt, e.g. oil, removed, and after dunnage is laid such sugar may be stowed as ordinary bag cargo.

In stowing a full cargo of sugar, especially soft sugar such as Cuban, special allowance must be made for "sinkage." That is to say, a bag must not be allowed to overlap a stringer plate or a stay plate, otherwise when the cargo sinks, as it will do during the voyage, the bag will be cut or broken. This specially applies to the portable beams in the tween deck hatches, as bags stowed across these beams are often cut completely in half. When stowing bags in this vicinity the tiers should be brought up close underneath the beams, then the tiers laid fore and aft and between the beams, with the ends kept about 3 or 4 inches clear of the beams.

The tiers should be carried up in this manner until about one foot higher than the portable beams, then the bags should be laid over this space in a tier, so that when the cargo sinks, the bags will clear the hatch beams and not be damaged.

The actual stowage capacities (given in Ch. VIII) may vary considerably, e.g. fine sugar from St. John's differs very much according to the time of manufacture. Bags loaded that have been refined for some time and crystallisation maintained have stowed in 48.4 cubic feet, whilst the same refined sugar coming direct from the refineries to the same ship, stowed in 49 cubic feet.

In carrying sugar special care must be taken as regards ventilation. With raw or semi-refined sugar, considerable condensation takes place, and this, running down the vessel's sides, unless great care is taken in laying the dunnage, will often run on the lower decks, and also on the floors of the lower hold, and coming in contact with the sugar will moisten it and cause considerable melting, and consequent loss. **Therefore, in carrying a cargo of this nature every opportunity should be taken to open the hatches in fine weather, and also to pay particular attention to the ventilators to see they are kept back to wind.**

Two vessels recently came into the Port of London from the same loading port with cargo shipped at the same time, one in which every care had been taken to ventilate the sugar, and the other whose holds had practically been hermetically sealed during the whole voyage. The former turned her cargo out in excellent condition, and the latter in bad condition, and even in her tween decks, had about 2 or 3 inches of drainings from the sugar.

TIMBER

By this is meant all the wood which is carried by sea for any purpose whatsoever.

It is extremely difficult to split up "timber carriage" into any particular classes, but it will be convenient to look at it from two points of view, that is to say full and part cargoes. For all Weights and Measures affecting Timber see page 235. For all figures relative to Timber Stowage see page 278. For all information relative to Timber Deck cargoes see page 118.

Full Cargoes

The bulk of the timber-carrying is done by full cargoes, and in many cases vessels are specially constructed for the carriage of timber in bulk.

In dealing with full cargoes many things have to be considered, viz. the kind of timber carried, the season of the year and also the intended voyage.

There are various large timber trades, but generally speaking those known as the Baltic and the Pacific are the most important.

The bulk of the timber imported into the United Kingdom comes from the Baltic usually in a small type of vessel, on what is of course, a short voyage, whilst the bulk of the Pacific lumber is shipped to the Far East, Australasia, and other destinations, usually on long voyages and consequently in large vessels. For this reason the matter of stowage in these latter vessels is specially important, so as to be able to combine a good loading with a stable vessel. We have therefore made a point of dealing more fully with the Pacific trade.

As regards the stowage of Baltic timber, this depends entirely on the kind of wood being carried. It is mostly light timber, consisting of deals, battens and boards, flooring, doorstock, etc.

Deck cargoes are carried under B.O.T. regulations (q.v.) page 119, which affect any timber being brought into the United Kingdom during the winter months.

The timber trade of the North Atlantic between the U.S.A. and Europe, and the U.S.A. and Southern countries is also extensive, but the stowage will naturally depend on the class of timber, and also between which countries it is being carried.

Pacific Trade. This, in our opinion, is probably the most important timber trade. There is a large amount shipped coastwise on the Pacific in specially constructed vessels, but no useful purpose would be served by our entering into any description of the stowage of these vessels.

The bulk of lumber shipped from the Pacific is Douglas Fir, with a good proportion of Hemlock and Cedar. Bales of Pulp are very often carried in the vessels carrying this timber. Baby squares and flitches etc. are used extensively as broken stowage.

Each country taking lumber from the Pacific has its own specifications. China is good with a large proportion of sleepers and cut lumber. Australia is good with cut lumber, doorstock and mining timber. South Africa and the East Coast of U.S.A. are the same as Australia, but minus the mining lumber. Japan is the poorest for stowage purposes, the cargo being all squares and logs, as the cutting is mostly done in Japan.

Good stowage of these cargoes depends entirely on the class of timber and the specification. Great attention to stowage and stability is necessary whilst loading to ensure taking a good cargo.

A combination that will just put a vessel down to her marks with the minimum use of water ballast is :

Green Redwood first stowed in the lower hold.

Dry Redwood in bridge space and upper deck.

Douglas Fir loaded then and on deck.

Hemlock is heavier than the Fir, and one cannot expect to carry a good deck load if Hemlock is stowed well up, and the Fir below.

Assuming the under deck cargo to be stowed, we now come to the **Deck Cargo.** Naturally the amount of deck cargo a vessel will carry depends entirely on what she has below or underdeck, and her stability.

A single deck ship of say 7500 tons d.w. (about 380 feet in length and 52 feet in breadth) should carry a deck load of e.g. 750 to 1000 mille, and range from 15 to 17 feet in height—this refers to a 3 island vessel, and a tween deck ship should carry almost as big a deckload.

A shelter decker, however, is a different proposition, for one must remember that the main deck is below. Generally speaking one should get from 8 to 11 feet above the shelter deck ; or a rough estimate would be, that the height of a deck load of a shelter decker is two-thirds of the height of the shelter deck deducted from what a single deck ship would lift. For example, assuming a ship had a 9 feet shelter deck and a similar sized single decker carried a 16 foot deck cargo, the shelter decker would take about a 10 foot deck load on the open deck.

Part Cargoes

Much timber is carried as "Part" cargo and in parcels. It is becoming very common nowadays to ship timber, especially sawn and finished timber of prime quality, in parcels, amongst general cargo.

In stowing parcels of timber great care and attention should be paid to proper stowage. No rules can be laid down as to what part of a vessel timber should be carried, but **more careful consideration must be given to its position in the hold relative to other cargo, than to its actual "stowage."**

A large amount of timber is carried in part cargoes from the U.S.A. to U.K. and Continental ports, and a considerable quantity of prime woods are shipped, including whitewood, poplar, oak, mahogany, etc., of which a large proportion is used in furniture manufacture and other purposes. This timber is carried amongst a general or mixed cargo, and serious damage has often been caused to it through faulty stowage.

Casks of resin have been stowed on top of prime lumber with the result that the lumber has been badly damaged. Leakage of turpentine has also often caused damage to lumber. In this case it is necessary to stow the timber either in a deck by itself or on top of the turpentine and resin.

Again, in many instances heavy cases have been stowed above fine boards of mahogany, whitewood, etc., and, although the greatest care may be taken in discharging, it is almost impossible to avoid damage when handling such cases above this class of goods. Such timber should be stowed perfectly flat, piled absolutely "en bloc" and not mixed with other cargo.

The timber trade in the East originally carried on with full cargoes of teak and other hard woods, has practically died out, and it is now carried mostly in parcels in the regular liners. In some cases teakwood planks are shipped at a reduced freight for use as dunnage under rice. In this case, care must be taken to see that these teakwood planks are laid flat, and that the ends are not "hung up," otherwise damage will occur.

The following list comprises the usual kinds of timber carried by sea, in various forms such as logs, sawn wood, etc., and any special features respecting them have been appended:

Acacia. There are many varieties of trees and plants, such as Black and Myall, many of which are noted for producing valuable gums.

Amboyna. A wood found on Amboyna in the Dutch East Indies and largely used for inlaying in cabinet work. It is valuable, but requires no special stowage except that it must be kept dry.

Ash. Ash is usually shipped in the form of logs, but also as planks and boards. It is tough and elastic, being used for the manufacture of many articles, such as furniture, etc., and for the interior finish of houses.

Aspenwood. The wood of the Aspen tree, a member of the Poplar family. (See Dyewoods, page 169.)

Balsa. A native of British Honduras, and is the lightest known wood, being lighter than cork. It is used as a lining for refrigerating chambers, etc.

Baltic Redwood. See Redwood.

Baltic Whitewood. See Whitewood.

Barwood. This is the same as Camwood (q.v.).

Batten. A strip of sawn wood usually 7 ins. broad and less than 4 ins. thick and more than 6 feet long. Pieces shorter than 6 feet are termed "batten ends." The word is also used for any strip of wood used for nailing across two others. In England a deal less than 7 ins. wide is termed a batten.

Baulk. A large beam, especially the tie beams of a house. Several kinds are shipped, including New and Kapp Baulks.

Beech. A hard fine-grained wood much used for tool handle manufacture, brush blocks, etc. Carried both in the form of logs and sawn timber.

Birch. A valuable hardwood used for many purposes. It is a close-grained wood that takes a good polish and is exported in the form of square logs and converted planks and used for plywood.

Bitterwood. A West Indian tree from which the wood of the Jamaica Quassia (q.v.) is obtained. The bark is very often shipped. For stowage see Bark, page 43.

Blackwood. A dark coloured hard-grained wood from Indian trees, much used in making furniture and in buildings. Usually shipped in straight square logs; no special stowage is required. The Blackwood ware, made mostly in China and Japan and shipped in cases, must be kept thoroughly dry.

Boards. A piece of timber of varying dimensions, but usually upwards of 4 to 6 inches in width and less than about 2 inches in thickness, according to the locality.

Boxwood. A heavy close-grained hardwood, light yellow in colour, that will not float in water. It is used by turners and engravers and employed in a large degree for the manufacture of scales for instruments. It is exported from Africa, America, etc., in the form of straight round logs up to 10 inches in diameter, but also carried as small billets or stakes 2 to 3 feet in length from ½ in. to 6 ins. in diameter.

Brazilwood. A heavy dyewood. See Sapanwood.

Also the wood of a tropical American tree in great demand for the red and purple dyes obtained from it. It is one of the soluble Redwoods (q.v.).

Brierwood (Briarwood). The root wood of the Brier tree much used in tobacco pipe manufacture.

Calamander Wood. The wood of an East Indian tree. It is hazel brown with black stripes and employed in the manufacture of furniture.

Californian Redwood. See Redwood.

Camwood (Barwood). A red dyewood from West Africa, where it is used as a body ornament by the native women and known as Kambi. Usually only shipped in small quantities and requires no special stowage. It must be kept dry, however, and specially protected from sea water, which will discolour it.

Cedar. Any of a large number of trees giving very durable timber. **Western Red Cedar** is soft and very light. It is the largest true cedar in the world and famed for its resistance to decay. Used in cabinet-making and for all purposes in which the material is exposed to the weather. **Port Orford Cedar** (White Cedar) is frequently used for imitation mahogany and as railroad ties. This timber is easily split and consequently great care should be used in handling.

Cedar Slats. These are strips of board from the cedar tree much used for lining furniture, making cigar boxes and for covering lead pencils, etc. They are usually shipped in cases which require careful handling, as the contents are generally too heavy for the light cases that are mostly used and which are easily broken; when the contents may be damaged. They should be protected against taint.

Chestnut. The coarse-grained light wood of this tree is used for many purposes, such as cabinet work, etc. Now much used combined with twisted wire for making light portable fencing.

Coco-Colo. A beautiful coloured hardwood used in cabinet-making. It is usually shipped in logs which require to be carefully handled and stowed.

Cocus-wood. The wood of the Granadilla tree, used for making musical instruments. See Granadilla.

Cottonwood. Species of an American tree. **Black Cottonwood** is a poplar, particularly adapted to pulp and also box manufacture.

Crown Trees. Small sleepers from 3 to 6 feet in length used in coal mines.

Deals. A fir or pine board cut to specific lengths.

Standard deals are usually 3 ins by 9 ins. by 12 feet long.

Whole deals are 1¼ in. thick. Slit deals are ⅝ ins. thick. Five cut stuff is ½ in. thick or less.

Deal ends are pieces less than 6 feet in length.

Douglas Fir (Oregon Pine). Also called Douglas Spruce, Red Fir, Washington Fir, and Oregon Fir.

Douglas Fir is the most important tree of the Western coast of North America and is extensively shipped in the form of lumber, laths, and pickets. It is light but very strong, and is much used for building purposes, mast and spar making, etc.

It is exported to the U.K. usually in 20-40 feet lengths and much used as decking, flooring etc.

Douglas Fir sleepers are usually shipped green and creosoted on arrival in Great Britain.

Water will not saturate Douglas Fir, but drain off when loading. The squares will float cornerwise.

Dyewoods. These are woods from which dye matter is obtained. The usual ones are Aspenwood, Camwood, Fustic, Lima, Logwood, Red Sanders, Sandalwood, Sapanwood, etc.

They are usually heavy and are generally shipped in small pieces which require no special stowage except that they must be protected from water, which will often seriously damage them by discoloration.

Ebony. A heavy, hard and durable wood greatly prized for its black colour. Much used in cabinet and instrument making. Often shipped in bags, it requires special attention as it is valuable. The pieces are usually 4 to 6 feet in length and weigh 50 to 75 lb.

Elm. A hard, tough wood which is usually carried in the form of squared logs ; used in shipbuilding and furniture making.

Fir. Timber resembling Spruce, such as Douglas Fir (q.v.) and Noble Fir, which is non-resinous and non-smelling, largely employed for making such articles as butter-boxes, etc. It is heavier than Douglas Fir.

Fustic. A yellow dyewood obtained from West Indian plants and much used in wool dyeing. Shipped from Costa Rica, Mexico and Nicaragua in 3 to 6 foot lengths. It is small and crooked but very heavy, and may be used as broken stowage. The extract is sometimes carried in bags.

Granadilla (Grenadilla or Granadillo). A dark red hard wood much used for making musical instruments such as flutes, etc.

Greenheart. A very strong wood used in shipbuilding and turnery. It resists worm in sea water. Shipped from the West Indies and South America, usually in the form of moderately square logs

Hacmetac. The Tamarack or American larch (q.v.).

Hemlock (Pacific or Western). A large American tree whose timber is hard and of good quality. It is light and used for flooring, making oil cases and pulpwood, etc. The bark is valued for tanning. Sometimes carried in the form of Extract (q.v. page 61).

Hickory. One of the North American trees. A tough, heavy wood used by wheelwrights, coachbuilders, etc., and is generally carried in bundles.

Hornbeam. A tree that gives a hard tough white wood. Exported from France and used for cog wheels etc.

Ironbark. An Australian eucalyptus tree with very heavy timber.

Jackwood. The wood of the Jack tree used in cabinet-making.

Jarrah. A dark-coloured hardwood grown in Western Australia, and largely used for sleepers owing to the fact that it is unaffected by ants and other insects. It is also used for piles and underwater work in tropical climates, as it is impervious to worm. It was also formerly used in short lengths for woodpaving and was very durable, and was also used for many domestic purposes such as furniture-making, etc. In stowing a full cargo of sleepers the vessel will not be anything like full, and it is therefore the custom to keep the sleepers apart in the lower tiers in order to raise the weight and so have an easier vessel. Care must also be taken when loading and discharging jarrah wood that it is properly slung, as any pieces getting adrift and falling overboard will sink.

Karri (Kari). The hard redwood of the giant gums of Western Australia used in shipbuilding, for railway wagons, etc. Shipped usually under the same conditions as Jarrah (q.v.).

Kauri. A New Zealand tree giving logs of large dimensions. See also Kauri, page 73.

Lancewood. A tropical American tree that furnishes the tough elastic wood that is used for shafts, spars, etc.

Larch. There are several trees of this species. **Tamarack** is usually shipped in square logs. **Western Larch** is a reddish brown wood, employed for all purposes in which strength and durability are required. Also used for making pitprops.

Laths. Narrow strips of wood largely used in the building trade, etc. There are three thicknesses.

Single lath, lath and a half (usually $\frac{1}{4}$ in. thick), and double lath (about $\frac{1}{2}$ in. thick).

Lignum vitae. A hard, dark-coloured, close-grained wood much used for sheaves in wooden blocks, and also for underwater bearings such as the linings of stern tubes, etc. It is the heaviest known wood and is usually carried in short lengths.

Logwood. The wood of the Logwood tree, a native of Central America. It is carried in irregular, ugly shaped pieces of root and branches. The heartwood when cut into chips in conjunction with other materials, forms a valuable black dye. Shipped usually in bundles, it requires no special stowage. The extract used in pharmacy is now carried. See Extracts, page 61.

Mahogany. A valuable hardwood tree used largely for cabinet-making and furniture. It varies in colour from reddish brown to yellowish brown. It was formerly shipped in heavy logs, but the practice now is increasing of shipping it already cut into boards or planks. British Guiana mahogany is called " Red Crabwood."

Maple. A light-coloured close-grained hardwood, largely employed for interior furnishing and hardwood floors, etc. It is shipped from the U.S.A. in the form of planks, boards, and blocks, and much used as veneer.

Marblewood. A large Asiatic tree giving a hardwood much used for cabinet-making.

Mora. A tough chestnut-like tree used in shipbuilding and for sleepers, etc.

Muskwood. The wood of a West Indian tree resembling mahogany.

Oak. There are a large variety of oaks, all of them hard and durable, that are much used for a great many purposes, such as building, furniture-making, etc. where a hard durable wood is required.

AUSTRIAN OAK is shipped in the form of billets or converted planks and boards.

JAPANESE OAK is shipped in the form of hewn and sawn logs, staves, sleepers, etc.

STETTIN AND DANZIG OAK is shipped in the form of billets and wainscot logs and also as staves for barrel-making, etc. Much oak is shipped from the Southern States of America, mostly as sawn lumber.

Pickets. Pointed or sharpened stakes, posts, etc.

Pine. There are many pines which give good durable white or yellow timber, which is often highly resinous.

CYPRESS. A tree whose timber is much used in carpentry.

NORTHERN (Called also Baltic Fir). Ordinary red and yellow deal. Some logs and short ends are shipped and used for slating, floorboards, etc. It is largely used after treatment for railway sleepers, and in short lengths for props.

OREGON. See Douglas Fir.

PITCH. This tree is used largely for spars and constructional work, etc. It yields turps and resin, and is usually shipped as sawn and hewn logs, and as sawn lumber. Called Southern Yellow Pine in U.S.A.

RED (Norway Pine or Yellow). Shipped as planks, deals, etc.

SUGAR. A very resinous wood and much used for interior finishes and box-making.

WESTERN WHITE. Is a light wood used in building, furniture and box-making, etc.

WEYMOUTH. (Yellow or Quebec). Shipped as Waney boards (q.v.). A strong wood used for pattern-making.

WHITE. White deal or Baltic whitewood (q.v.).

YELLOW. See Pitchpine.

Pitprops (Pitwood). Short pieces of trunk of the fir and other trees used in mining. Usually shipped in full cargoes and requires no special stowage. They should be below 9 feet in length to get good stowage. 10% of the cargo is usually shipped up to 13 feet in length.

Plywood. This is made by joining together three or more layers of thin wood similar to veneer, in large sheets so placed that the grain of each layer lies in the opposite direction to that above and below, the whole making a very light pliable and strong sheet of wood. Used for fretwork originally, but is now made in varying kinds and used for panelling, furniture, and many other purposes. It is shipped largely from the Baltic packed into bundles and bales, with a rough piece of wood on each side, held together with bands, and sometimes in cases.

Purple Heart. A strong durable purple-coloured wood from several tropical American trees, more especially the Copaiba tree.

Quassia. Several varieties of tropical American trees that give timber and bark (see page 33). The timber is exported in the shape of logs and requires no special stowage.

Quebracho. This wood is largely shipped from the Argentine in the form of logs which are very heavy and crooked but require no special stowage. Also carried largely as the Extract (q.v., page 61).

Red Sanders (Sanders wood). Sometimes called Sandalwood, this is a valuable dyewood. It is very heavy and sinks in water, while salt water turns it black. Care should be taken that the logs or pieces are neither cut nor broken, and it should not be stowed near oil, tar, saltpetre, etc. Also shipped as chips, and in the form of powder which requires no special stowage.

Redwood. Any wood that yields red dye, the more important being Brazilwood, Sapanwood, Peachwood, Limawood, Camwood, Barwood, and Red Sanders or Red Sandalwood. The term "Redwood" is also applied to many trees that have a reddish colour.

CALIFORNIAN REDWOOD is a handsome brownish-red light wood much used on the Pacific coast. It is usually exported in the form of logs, and should never be shipped on deck or salt water will blacken it on the surface.

Rickers. These are small stout poles used for scaffolding in various industrial plants. They are usually carried in the bark in lengths varying from 16 to 50 feet.

Rosewood. The most important and valuable red-coloured hardwood used for furniture-making. It is exported from Brazil in round logs of 36 ins. or more in diameter.

Sabicu. The hard wood of a West Indian tree. It is very heavy, and is usually exported from Cuba in the form of square logs.

Sandalwood. A close-grained fragrant yellowish wood of an East Indian tree whose odour drives away insects. The heartwood is much used for cabinet-making and ornamental carving. The wood requires very careful handling and stowage.

Sapanwood. A red dyewood obtained from an East Indian tree. The wood is a soluble redwood.

Satinwood. A very hard, yellowish-brown wood having a satiny lustre, employed for fine cabinet work, farming tools, etc.

It is shipped from the West Indies in square and round logs —the latter in 10 to 20 feet lengths.

Sequoia. A giant tree, a species of Californian Redwood (q.v.).

Shingles. These are wooden tiles, like slates, used for roof covering, having one end thinner than the other. A great quantity of Red Cedar is shipped as shingles.

Shooks. A set of staves and heads sufficient for one cask, or a set of parts of boxes, ready to be put together. They are carried in bundles.

Tea chests are shipped to India in the form of shooks, cut to size with clamps usually bound round with hoop iron at each end, as this effects a great saving of space.

Sleepers. Sleepers are sometimes made of iron and steel but usually of hardwoods, such as oak, Douglas Fir, etc. They are often impregnated with creosote and consequently emit a strong odour. On no account should foodstuffs, or articles liable to damage by taint, be stowed in the same hold that has contained sleepers, until it has been well cleaned out and deodorised.

It is as well to remember that this odour is difficult to remove and may sometimes adhere to the vessel for a considerable time.

If sleepers are creosoted before shipment, it must be borne in mind that this makes a considerable difference to the weight and therefore the carrying capacity. Sleepers are termed " ties " in the U.S.A.

Snake Wood (Letter or Leopold Wood). The mottled hard wood of a South American tree used for veneering.

Spruce. The wood of a number of trees which is light, soft and fairly strong. It is variously employed.

AMERICAN BLACK SPRUCE is much used now for wood pulp and also for floor boards, etc.

WESTERN SPRUCE (also called SITKA, SILVER SPRUCE and PACIFIC SPRUCE). A spruce of the North Pacific Coast and is the largest spruce. It is used for the sounding boards in musical instruments, and for box-making (especially those to be used for food products). Western spruce is the ideal wood for aeroplane construction.

Staves. Are used in cooperage and are shipped in varying lengths according to requirements.

They are seldom now shipped in full cargoes, but being small and handy are very easy to stow, and are excellent for broken stowage in a mixed cargo.

Stinkwood. Any of several trees whose wood has an unpleasant odour. In South Africa two trees of this name yield strong useful timber which is exported. Known as the South African Teak.

Tamarack. See Larch.

Teak. An East Indian tree whose timber is hard, strong, durable and yellowish-brown in colour. It is extensively employed in shipbuilding and is exported largely from Burma and Siam in the form of logs, planks, boards, etc.

In loading a cargo of teak care must be taken to see that each log is slung before being released from the raft, as there are what are termed " dead logs," and these may sink and be lost, in which case the ship will be held responsible.

With a cargo of teak usually a quantity of scantlings of varying sizes and lengths are shipped for broken stowage ; and sometimes railway keys for the same purpose.

Tulip wood. The handsome rose-coloured wood of a Brazil and tropical American tree, which is largely employed for inlaying in cabinet-making.

Tupelo. A species of North American tree having a hard cross-grained wood.

Veneer. Thin sheets of hardwood such as walnut, mahogany, etc., used to cover cheaper woods.

Walnut. The wood of several species. Common Walnut is valuable for making gunstocks. Black Walnut is valuable for furniture, etc.

Waney (Wany). Usually pieces of sawn boards when uneven or tapering are termed " waney " boards.

Whitewood. Any of a number of trees that give timber of a white or light-coloured wood. Largely used for house furnishing, etc.

Yellow Deal. In the U.S.A. the wood of the Yellow Pine. In Great Britain the Scotch Pine is so called.

Zebra Wood. Any of a species of coloured tropical American trees having beautifully-marked wood used in cabinet-making.

Timber Weights

Seeing that consignments of timber are very frequently in cubical contents, it is most essential that the approximate weight should be known.

The Master's prime duty is the consideration of the stability of his vessel, which he can easily determine if he knows weight, but of which he is often ignorant if his knowledge is limited to cubical capacity.

Of course where the cargo stows at a specific number of cubic feet per ton and this figure is known, the information required is easily obtainable.

But whatever information is obtainable, the distribution of weight where mixed cargo is concerned is of vast importance.

All the information can be easily determined if the Specific Gravity of the cargo is known.

A cubic foot of water weighs 1000 oz. If, then, the Specific Gravity of the timber be written down to three places, by merely ignoring the decimal point and calling the figures ounces, the weight is known.

Example. A vessel carried 100,000 cubic feet of cork, the s.g. of which is .240. Hence 1 cubic foot weighs 240 oz. That is, 15 lb.; and the cargo weighs 100,000 × 15 lb. = 1,500,000 lb. = 670 tons approx

Further 1 Stere = 1 Cubic Metre = 1,000,000 Cubic Centimetres. Now as a cubic centimetre weighs a gram, the s.g. of the timber is the weight in grams of one cubic centimetre. A stere of water weighs 1000 kilograms, that is a Metric ton; hence the Specific Gravity gives the weight of a stere of timber in metric tons.

Example. A vessel loads 10,000 stere of timber of s.g. .58. Hence 1000 stere weighs 580 metric tons and the load is 5800 metric tons.

It must always be remembered that in dealing with timber the Specific Gravity is a very variable quantity; timber from the same tree varying greatly according to its age and its fibre. In addition the state of the timber and degree of seasoning will modify its specific gravity. Whenever figures are consulted they should be considered as average densities, unless specially noted.

The table on p. 176 gives the approximate weight in pounds per cubic foot of various woods—the timber in every case is supposed to be dry unless specifically stated to the contrary.

	Average lb. per cu. ft.
Acacia	42
Ash	50
Aspen	27
Baltic Timber (Approx)	35
Bamboo	25
Beech	43
Birch	44
Blackwood	56
Boxwood	60/70
Cedar—	
Dry	28
Green	35
Chestnut—	
Dry	34
Green	55
Cork	15
Cotton Wood—	
Black (kiln dried)	23
Green	46
Cypress	28
Douglas Fir—	
Dry	29
Green	38
Ebony	75
Elm—	
Dry	36
Green	59
Fir	30/40
Fustic	60
Greenheart	63
Hemlock—	
Fresh Sawn	50/65
Western	28
Hickory	47
Holly	47
Hornbeam	47
Ironbark	64/67
Jarrah	52/55
Karri	58
Kauri	36
Lancewood	42/63
Larch	32/33
Lignum Vitæ	83
Lime	35

	Average lb. per cu. ft.
Mahogany—	
Honduras	35
Spanish	53
Maple	49
Mastic	63
Oak—	
American	54
European	43/62
Pine—	
Norway	34
Pitch	58
Northern	27
Longleaf	42
Shortleaf & Loblolly	38
Western White :	
Dry	28
Green	38
Yellow	32
Red	38
Redwood—	
Dry	26
Green	60
Rosewood	45
Sassafras	30
Satinwood	56
Shingles—	
Dry	16
Green	20/25
Spruce	30/34
Sycamore—	
Dry	37
Green	40
Teak—	
African	61
Indian	41/55
Walnut—	
Dry	39
Green	58
Whitewood—	
Dry	35
Green	55
Willow—	
Dry	30
Green	38

CHAPTER IV

DANGEROUS CARGOES

WERE it not for the fact that the Board of Trade definitely designate certain commodities as " Dangerous Cargoes," it would be most difficult to decide what cargoes are dangerous and what are not. Almost every cargo may, under certain conditions, be dangerous.

To illustrate this point may be cited the recent experience of one of the author's when a cargo of cheese almost caused the death of two ship's officers. In passing through the tropics the cheese, evidently shipped " new," " sweated," with the result that great volumes of carbonic acid gas were evolved. The gas is very heavy and collected in the bottom of the hold. The upper tiers of cargo had been discharged and on entering the compartment the officers were immediately gassed, artificial respiration being necessary to revive them.

Many other " harmless " cargoes may, by the combined effect of temperature and moisture, behave in a similar manner, especially sugar, maize, fruit, etc.

Care should always be exercised when entering a compartment containing a cargo, from which carbonic acid gas may have been evolved during transit.

The gas is neither odorous nor visible and thorough ventilation is imperative. Any gas must be driven out by machinery or windsails. The presence of the gas may be readily detected by lowering into the hold a lighted candle, which would be immediately extinguished if carbonic acid gas were present.

For the purpose of this chapter, however, cargoes are listed as dangerous under the following categories :—

(*a*) Cargoes liable to cause damage to the vessel.

(*b*) Cargoes which endanger human life.

(*c*) Cargoes which are a source of danger to other cargo.

While it is obvious that (*a*) includes the others, and (*b*) embraces (*c*), it would be futile to attempt any rigid distinction between these three groups.

That such groups are recognised is evident by the Board of Trade Regulations which require (*a*) to be plainly marked **" Dangerous,"** (*b*) to be marked **" Poison,"** and (*c*) **" Special**

Stowage"—these markings to be in RED letters, two inches deep. The "Flash Point" must be stated when required.

In the stowage of Cargoes such as require the special markings of the Board of Trade, the following principles should be rigidly observed.

1. The compartments must be well ventilated.
2. Proximity to the engines to be avoided.
3. Stowage must not be under or in the neighbourhood of passenger accommodation or near crew's quarters.
4. The positions should be easily accessible.
5. A dangerous cargo must be well separated from any other cargo of a dangerous nature.
6. Indiscriminate stowage "on deck" must be avoided; and when dangerous cargo is carried on deck it should be securely lashed with chain or wire, and the other conditions here mentioned must not be overlooked.
7. Poison cargoes must be kept well away from foodstuffs.

It should be noted that "Dangerous" cargoes may not be conveyed in Emigrant ships without the expressed authority of the Board of Trade.

By the permission of the Board of Trade and His Majesty's Stationery Office, it has been possible to reproduce such portions of the Regulations for the Carriage of Dangerous Cargoes as specifically regulate the packing and stowage of certain articles.

In the following pages all extracts from these regulations are given in small type:

EXTRACTS FROM THE MERCHANT SHIPPING ACT, 1894.

301.—(1) Subject to the provisions of this part of this Act as to military stores, an emigrant ship shall not clear outwards or proceed to sea if there is on board—

(*a*) as cargo, any article which is an explosive within the meaning of the Explosives Act, 1875, or any vitriol, lucifer matches, guano, or green hides, or

(*b*) either as cargo or ballast, any article or number of articles which by reason of the nature, quantity, or mode of stowage thereof are, either singly or collectively, in the opinion of the emigration officer at the port of clearance, likely to endanger the health or lives of the steerage passengers or the safety of the ship, or

(*c*) as cargo, horses or cattle or other animals mentioned in the Thirteenth Schedule to this Act, except they are carried on the conditions stated in that schedule, which shall have effect as if contained in this section.

(2) If any requirement of this section is not complied with in the case of any ship, the owner, charterer, or master of the ship, or any of them shall for each offence be liable to a fine not exceeding three hundred pounds.

302.—(1) A Secretary of State may, by Order under his hand, authorise the carriage as cargo in any emigrant ship (subject to such conditions and directions as may be specified in the Order) of naval and military stores for the public service, and those stores may be carried accordingly.

(2) The Order shall be addressed to the emigration officer and shall be by him countersigned, and delivered to the master of the ship to which it refers, and shall be delivered by the master to the chief officer of Customs at the port where the stores are discharged.

(3) The master shall comply with all the conditions and directions in

the Order, and, if he fails to do so, shall for each offence be liable to a fine not exceeding three hundred pounds.

446.—(1) A person shall not send or attempt to send by any vessel, British or foreign, and a person not being the master or owner of the vessel shall not carry or attempt to carry in any such vessel any dangerous goods, without distinctly marking their nature on the outside of the package* containing the same, and giving written notice of the nature of those goods and of the name and address of the sender or carrier thereof to the master or owner of the vessel at or before the time of sending the same to be shipped or taking the same on board the vessel.

(2) If any person fails without reasonable cause to comply with this section, he shall for each offence be liable to a fine not exceeding one hundred pounds; or if he shows that he was merely an agent in the shipment of any such goods as aforesaid and was not aware and did not suspect and had no reason to suspect that the goods shipped by him were of a dangerous nature, then not exceeding ten pounds.

(3) For the purpose of this part of this Act the expression "dangerous goods" means aquafortis, vitriol, naphtha, benzine, gunpowder, lucifer matches, nitro-glycerine, petroleum, any explosives within the meaning of the Explosives Act, 1875, and any other goods which are of a dangerous nature.

447.—A person shall not knowingly send or attempt to send by, or carry or attempt to carry in, any vessel, British or foreign, any dangerous goods under a false description, and shall not falsely describe the sender or carrier thereof; and if he acts in contravention of this section, he shall for each offence be liable to a fine not exceeding five hundred pounds.

448.—(1) The master or owner of any vessel, British or foreign, may refuse to take on board any package or parcel which he suspects to contain any dangerous goods, and may require it to be opened to ascertain the fact.

(2) Where any dangerous goods, or any goods which, in the judgment of the master or owner of the vessel, are dangerous goods, have been sent or brought aboard any vessel, British or foreign, without being marked as aforesaid, or without much notice having been given as aforesaid, the master or owner of the vessel may cause those goods to be thrown overboard, together with any package or receptacle in which they are contained; and neither the master nor the owner of the vessel shall be subject to any liability, civil or criminal, in any court for so throwing the goods overboard.

449.—(1) Where any dangerous goods have been sent or carried, or attempted to be sent or carried, on board any vessel, British or foreign, without being marked as aforesaid, or without such notice having been given as aforesaid, or under a false description or with a false description of the sender or carrier thereof, any court having Admiralty jurisdiction may declare those goods, and any package or receptacle in which they are contained, to be, and they shall thereupon be, forfeited, and when forfeited shall be disposed of as the court direct.

(2) The court shall have, and may exercise, the aforesaid powers of forfeiture and disposal notwithstanding that the owner of the goods has not committed any offence under the provisions of this Act relating to dangerous goods, and is not before the court, and has not notice of the proceedings, and notwithstanding that there is no evidence to show to whom the goods belong; nevertheless the court may, in their discretion, require such notice as they may direct to be given to the owner or shipper of the goods before they are forfeited.

450.—The provisions of this part of this Act relating to the carriage of dangerous goods shall be deemed to be in addition to and not in substitution for/or in restraint of, any other enactment for the like object, so nevertheless that nothing in the said provisions shall be deemed to authorise any person to be sued or prosecuted twice in the same matter.

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* Marking a package with the initial letters of the contents is not held to be a distinct marking of the nature of the goods as required by this Section. The nature of the contents of each package must be fully written out in English on the package, and in addition the written notice required by the section must also be given.

459.—(1) Where a British ship, being in any port in the United Kingdome, is an unsafe ship, that is to say, is by reason of the defective condition of her hull, equipments, or machinery, or by reason of overloading or improper loading, unfit to proceed to sea without serious danger to human life, having regard to the nature of the service for which she is intended, such ship may be provisionally detained for the purpose of being surveyed, and either finally detained or released. . . .

462.* Where a foreign ship at a port in the United Kingdom is unsafe by reason of overloading or improper loading, the provisions of this Part of this Act with respect to the detention of ships shall apply to that foreign ship as if she were a British ship. . . †

EXTRACT FROM EXPLOSIVE SUBSTANCES ACT.

8.—(2) Where the master or owner of any vessel has reasonable cause to suspect that any dangerous goods or goods of a dangerous nature which if found he would be entitled to throw overboard in pursuance of the Merchant Shipping Act, 1894, Section 448, are concealed on board his vessel, he may search any part of such vessel for such goods, and for the purpose of such search may, if necessary, break open any box, package, parcel, or receptacle on board the vessel, and such master or owner, if he finds any such dangerous goods or goods of a dangerous nature, shall be entitled to deal with the same in manner provided by the said Act, and if he do not find the same he shall not be subject to any liability, civil, or criminal, if it appears to the tribunal before which the question of his liability is raised that he had reasonable cause to suspect that such goods were so concealed as aforesaid.

It will be convenient to consider cargoes in this chapter in two main classes :—

1. Cargoes which have specific regulations for their shipment, viz. Explosives and Poisons.
2. Other dangerous cargoes.

In the second group cargoes may be dangerous on account of inflammability, corrosiveness or odour.

Inflammable Cargoes include any article which is liable to spontaneous combustion, and volatile liquids having inflammable vapours.

Such cargoes must be carefully examined before shipment and given stowage in an upper deck, if possible, in an easily accessible place. The transport of Petroleum and other oils is of sufficient importance to warrant special consideration and is discussed in the chapter on Oils, page 134.

Corrosive Cargoes such as have a destructive action when brought into contact with parts of the vessel or other material, would be carried at "Shipper's risk," and in the event of emergency would be thrown overboard.

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* As amended by Section 2 of the Merchant Shipping Act, 1906.

† This provision does not apply to any foreign ship not bound to a port of the United Kingdom which comes into a port of the United Kingdom for any purpose other than that of embarking or landing passengers or taking in or discharging cargo or taking in bunker coal (Section 6, Merchant Shipping Act, 1906).

Odorous Cargoes are those which emit vapours which persist and permeate other cargo to their detriment.

POISONS

These goods are not at all dangerous provided they are well packed and securely stowed. But if they come in contact with life in any way, or with articles of an edible nature, then they become dangerous.

Poisons, Marking and Packing of.—Cases have occurred in which serious danger to life has been caused by the leakage of packages of arsenic and the consequent contamination of articles of food which also formed part of the ship's cargo.

Under the provisions of the Pharmacy Act, 1868, and the Poisons and Pharmacy Act, 1908, every package containing any of the poisons named in the list below when sold for export is to bear the name of the article and the word "POISON," and any person infringing the provisions of the Acts in this respect is subject to a penalty of five pounds for each offence.

Care should be taken in the package and stowing of poisons of all kinds on board ship, so as to avoid all risk of the contamination of other cargo. For this purpose the packages should be strongly constructed of substantial material so as to prevent any danger of breakage or leakage and should be stowed away from all food materials.

List of Poisons.

Part I.

Arsenic, and its medicinal preparations.
Aconite, Aconitine, and their preparations.
Alkaloids. All poisonous vegetables, alkaloids not specifically named in this schedule and their salts, and all poisonous derivatives of vegetable alkaloids.
Atropine, and its salts and their preparations.
Belladonna, and all preparations or admixtures (except belladonna plasters) containing 0.1 or more per cent. of belladonna alkaloids.
Cantharides, and its poisonous derivatives.
Coca, and any preparation or admixture of, containing 1 or more per cent. of coca alkaloids.
Corrosive sublimate.
Cyanide of potassium, and all poisonous cyanides and their preparations.
Emetic tartar, and all preparations or admixtures containing 1 or more per cent. of emetic tartar.
Ergot of rye, and preparations of ergots.
Nux vomica, and all preparations or admixtures containing 0.2 or more per cent. of strychnine.
Opium, and all preparations or admixtures containing 1 or more per cent. of morphine.
Picrotoxin.
Prussic acid, and all preparations or admixtures containing 0.1 or more per cent. of prussic acid.
Savin, and its oil, and all preparations or admixtures containing savin or its oil.

Part II.

Almonds, essential oil of (unless deprived of prussic acid).
Antimonial wine.
Cantharides, tincture and all vesicating liquid preparations or admixtures of.
Carbolic acid, and liquid preparations of carbolic acid and its homologues containing more than 3 per cent. of those substances, except preparations for use as sheep wash or for any other purpose in connection with agriculture or horticulture contained in a closed vessel distinctly labelled with the word "Poisonous," the name and address of the seller, and notice of the special purposes for which the preparations are intended.
Chloral hydrate.
Chloroform, and all preparations or admixtures containing more than 20 per cent. of chloroform.
Coca, any preparation or admixture of, containing more than 0.1 per cent. but less than 1 per cent. of coca alkaloids.
Digitalis.
Mercuric iodide.
Mercuric sulphocyanide.
Oxalic acid.
Poppies, all preparations of, excepting red poppy petals and syrup of red poppies (Papaver rhœas).
Precipitate, red, and all oxide of mercury.
Precipitate, white.
Stropanthus.
Sulphonal.
All preparations or admixtures which are not included in Part 1 of this schedule and contain a poison within the meaning of the Pharmacy Acts except preparations or admixtures the exclusion of which from this schedule is indicated by the words therein relating to carbolic acid, chloroform and coca, and except such substances as come within the provisions of Section 5 of the Poisons and Pharmacy Act, 1908.

MISCELLANEOUS

The following articles can from one cause or another be considered as "dangerous cargoes"; and whilst not attempting a thorough explanation of each article and its use, a few notes will be given in the hope that they may materially help in deciding on an adequate stowage.

Only the better known or more generally carried articles are given. It may be well to remind one that in the case of emigrant ships the carriage of any dangerous cargo must receive the approval of the Board of Trade.

Accellerene. A poisonous substance which will discolour any edible or other articles stowed near by. It must be securely packed in casks or drums and stowed in a well-ventilated, cool place, away from living accommodation.

Acetal. An inflammable liquid, and is usually stowed on deck only.

Acetate of Lead. Commonly known as Sugar of Lead. Very poisonous.

Acetic Acid. A somewhat corrosive liquid having a pungent smell. Probably carried in casks, which must be stowed well away from crew's quarters and foodstuffs.

Vinegar is a weak solution of Acetic Acid.

Glacial Acetic Acid is a solid—the concentrated form of Acetic Acid. Glacial Acetic is a powerful corrosive, blisters the skin, and is an acid poison. This form is carried in earthenware jars, or carboys if liquified, and should be stowed as deck cargo whenever possible.

See also Acids, page 107.

Acetone. Stowage as for Alcohol. (See also Inflammable Liquids.)

Acetylene Gas. This is a poisonous gas forming a dangerous explosive when mixed with air.

An order of the Secretary of State declares Acetylene in any form to be an explosive within the meaning of the Explosives Act 1875, except when contained in a porous substance with or without Acetone or other solvent.

The gas would be carried in cylinders, which must be plainly marked and stowed in a cool well-ventilated place.

Acetyloid. This is practically the same thing as Calcium Carbide (q.v.).

Alcohol. See Inflammable Liquids.

Aluminium Torches. Same conditions as Safety Matches.

Ammonia. Ammonia will be carried either as a gas or as a solution of the gas in water. If as a gas the ammonia will be contained in steel cylinders (see Gases).

The solution of the gas has a most pungent smell, and the danger in its transport lies in the fact that the solution gives off the gas at all temperatures, and sufficient may be evolved to burst the container.

It is essential that Ammonia solution should be kept as cool as conditions permit, and in the event of accident the compartment must be thoroughly ventilated before entry.

When covering a deck cargo of ammonia, never use a black tarpaulin.

Ammonia, Aqueous Solution of, Specific Gravity .880 *at* 60° *F.* may not be carried in emigrant ships without the permission of the Emigration Officer.

In other ships aqueous ammonia solution of the above strength if carried through the tropics may be contained in steel drums of not more than 12 gallons capacity, provided that the drums have been tested and withstood a water pressure of 66 lb. per square inch. An empty space of not less than 5.33 per cent. of its capacity should be left in each drum. The drums should be packed in cases holding not more than four in a case, with sawdust filling in the interstices between the drums. The solution may also be conveyed through the tropics in steel casks of not more than 90 gallons capacity, provided the casks have been tested by water pressure to 75 lb. per square inch and that an empty space of not less than 10 per cent. of its capacity is left in each cask when shipped.

Ammonia, Aqueous Solution of, Specific Gravity of .900 *to* .599 may be carried under the same conditions, and in similar packages, but the drums need only to be tested to 60 lb. per square inch, and the casks to 66 lb. per square inch.

When carried in temperate climates only, the drums and casks need only be tested to 50 lb. per square inch.

Small quantities of ammonia solution for pharmaceutical purposes may be carried in glass bottles, if an empty space is left for expansion, and the bottles are hermetically sealed, packed in strong cases, filled with sawdust, and stowed with such precautions as the circumstances of the case require.

A guarantee that the above conditions have been fulfilled should be produced at the time of shipment. As the expansion of ammonia solution at a temperature of 130° F. is rapid, and the risk of explosion thereby increased, it is strongly recommended that this commodity should be carried under deck in a cool, well-ventilated space away from all living quarters.

Ammonia, Aqueous Solution of, Specific Gravity of .959 or over.—No special precautions are deemed necessary if the specific gravity of the solution is .959 or over.

Ammonia, Liquefied Anhydrous, is ammoniacal gas compressed into liquid form and may not be carried in emigrant ships. In ships carrying explosives it may only be carried if the engine and boiler-room spaces intervene between the holds in which the explosives and this substance are carried.

It is dangerous, not only on account of the danger of explosion involved when it is not contained in vessels sufficiently strong to withstand the pressure which may be produced by a rise in temperature, but also on account of the highly dangerous nature of the gas, which is poisonous and lighter than air. It must be contained in cylinders which comply with the recommendations of the Home Office Committee of 1895 and stowed under deck in a cool, well-ventilated space away from all living quarters.

Ammonium Carbonate. If packed in sealed drums, this substance may be carried in any vessel. As a precautionary measure it is advisable to stow the package well away from articles of an edible nature and crew's accommodation. The only trouble experienced with this substance is that it gives off the pungent fumes of ammonia, an annoyance which is non-existent if the substance is properly packed.

Amyl Acetate (Pear Oil). An inflammable oil sold as pear essence. Treat as Alcohol (q.v.). Amyl Acetate is a powerful solvent and readily dissolves oils and paints.

Aniline. This is a poisonous liquid which gives off vapour. It should be stowed well away from foodstuffs or any articles that may be stained by leakage. Aniline must be packed in hermetically sealed drums.

Aniline Salt. A poisonous solid compound of Aniline, and if well packed in sound casks can be carried anywhere away from foodstuffs.

Aqua Fortis. See Nitric Acid.

Arsenic Compounds. All substances containing Arsenic are violent poisons. They should be given special stowage in a well-ventilated compartment. The oxide known as White Arsenic is the most important. This would be shipped in drums or casks.

Barium Peroxide or Binoxide.

Barium Peroxide or Barium Binoxide may not be carried in emigrant ships without the special permission of the Emigration Officer.

It must be packed in strong iron or steel drums, hermetically sealed and stowed away from engine or boiler room bulkheads and efficiently chocked off. It is necessary owing to its oxidising nature to stow it away from inflammable matter with which it could be rubbed if it should escape from the packages; care should also be taken to avoid risk of ignition from electrical short circuit, etc. The use of chlorine or sulphur dioxide gases must be avoided where the packages are stowed.

If this substance is packed in wooden casks it may be carried on deck only.

Benzene (Benzol). A product of Coal Tar. It is highly inflammable and should be carried in a manner similar to that for Benzine (v. seq.).

Benzine. A product of petroleum and an inflammable liquid which requires the same precautions as for petroleum spirit (q.v. page 138).

Bleaching Powder. Bleaching powder always contains free chlorine—a gas which readily attacks all metals. Care should be exercised that the containers, casks, cases, etc., are well sealed, and the cargo should be carried in an isolated place. In the presence of moisture the chlorine will destroy any vegetable colour. This free chlorine is a suffocating gas and hence stowage must be away from living quarters. Its keen affinity for hydrogen makes it particularly dangerous in the neighbourhood of turpentine, hydro-carbons and acids.

Bromine. This liquid is corrosive and gives off poisonous brown fumes which will stain anything in the neighbourhood. It should be given good stowage preferably on deck, and if carried in a vessel with explosives it must be carried on deck.

Calcium, Carbide of. This article must be properly packed as required by the Board of Trade Regulations (v. seq.) in a cool, dry place, in a hatch square, well-ventilated and not over-stowed. Explosives or goods liable to spontaneous combustion must not be stowed in the same hold.

In the event of such precautions not being taken the vessel is to be condemned as improperly loaded, and should be detained as unsafe if any attempt be made to proceed to sea.

When water is brought into contact with carbide of calcium, great heat is developed and acetylene gas evolved. This gas forms a violently explosive mixture with air. Obviously, therefore, if carbide of calcium is not stowed in such a way and in packages of such a character that water cannot possibly have access to it, very grave consequences may result, and in the confined space of a ship's hold, or indeed anywhere on board ship, the danger may be of a most formidable nature. In many ships carbide is carried for use on board, and the greatest care must always be given to the handling of the drums.

Two very serious accidents have occurred recently, in each case through carelessness in the handling of the drums. When about to be lowered into the engine room, the drums were dropped, and the carbide came into contact with the bilge water and produced acetylene. A light in the engine room caused the explosion of the mixture of gas and air.

The label on the vessel containing the said Carbide of Calcium shall bear in conspicuous characters the words "Carbide of Calcium," "Dangerous if not kept dry," and with the following caution: "The contents of this package are liable if brought into contact with moisture to give off a highly inflammable gas," and with the addition :—

(*a*) In the case of a vessel kept, of the name and address of the consignee or owner.

(*b*) In the case of a vessel sent or conveyed, of the name and address of the sender.

(*c*) In the case of a vessel sold or exposed for sale, of the name and address of the vendor.

Specific rules for the loading of Calcium Carbide are laid down by the Board of Underwriters of New York and are here inserted :

Calcium carbide may be stowed under deck of general cargo vessels in quantities not exceeding ten (10) per cent. of a vessel's net registered tonnage.

The packages are to be of one (1) hundredweight drums crated and two (2) hundredweight drums encased in wood. The packages must be stowed in between decks close to the hatches (but not under them) with no other cargo on top, and as far from the ventilators as possible. In single-deck vessels they must be stowed close to the hatches (but not under them) with no other cargo on top, and not within eight (8) feet of the bottom of the hold.

Calcium carbide must not be stowed in fore or after peaks, and must not be used for broken storage, nor be distributed in various parts of the vessel, but stowed in one compartment if possible. The compartment must always be well ventilated, and the packages stowed on their ends clear of all steam, fire, scupper pipes, and deadlights, and in the forward ends of compartments where bunkers adjoin, and not in the empty bunker space below. Calcium carbide should be stowed in poop and bridge spaces when practicable.

This commodity must always be stowed under the personal supervision of a surveyor of the board.

Calcium Cyanamide.

Calcium Cyanamide or Nitrolim containing more than 0.5 per cent. of carbide of calcium is regarded as dangerous cargo within the meaning of the Merchant Shipping Act, 1894, and may not be carried in emigrant ships. In ships carrying explosives it may only be carried if the engine and boiler-room spaces intervene between the holds in which the explosives and this substance are carried.

When containing 0.5 per cent. or under of carbide of calcium it may be carried below deck on any vessel (emigrant ships included if the additional restriction mentioned below is complied with) if packed in a dry condition in double sacking, the inner sacking being lined with waterproofed paper, the sacks to be perfectly dry and stowed in a hold reasonably well-ventilated and in such a position as to preclude the possibility of the sacks coming in contact with water.

If the avoidance of contact with water cannot be guaranteed, the carriage of this material should only be allowed when packed in hermetically sealed metal drums. Unless so packed it should be regarded as dangerous cargo.

In addition to the above restrictions this substance, if carried in emigrant ships, must not be stowed in any compartment in or over which passengers are berthed.

Calcium Phosphide. Water causes evolution of phosphine, a poisonous gas which is spontaneously inflammable. The substance must be well packed and stowed, and kept quite dry. The same precautions must be observed as for Calcium Carbide (q.v.). Calcium Phosphide is used in the construction of Holmes Lights.

Camphine. See Turpentine, page 146.

Carbic Cakes. These are packed and stowed under the same conditions as Calcium Carbide (q.v.).

Carbolic Acid. See Phenol.

Carbon, Bi-Sulphide of.

Carbon, Bi-Sulphide of, or *Carbon Bi-sulphuret*, is "Dangerous Goods" within the meaning of Section 446 of the Merchant Shipping Act, 1894, and should therefore be marked as required by that Section. It must not be carried in emigrant ships or in ships carrying explosives.

It is a colourless, heavy, mobile, volatile liquid, which evaporates very quickly. It produces a pressure in any closed vessel containing it. It easily passes through the smallest opening, and it is very difficult to keep the drums tight in which it is stored.

It is not liable to spontaneous combustion, but both the liquid and its vapour take fire at very low temperatures, the liquid at a rather lower temperature than the vapour. The vapour has a tendency to travel and if it finds its way to any surface sufficiently warm to ignite it, the flame will flash back and ignite the liquid. This is known to have occurred when the liquid was at a distance of 20 feet from the warm surface. The mere striking together of two pieces of iron within the inflammable atmosphere may cause ignition.

It has a very powerful penetrating odour, which, in small quantities resembles that of foul vegetable matter.

Bi-sulphide of carbon should be contained in strongly-made and perfectly tight drums of not more than ten gallons capacity each. The drums should be satisfactorily tested by hydraulic pressure to at least 40 lb. per square inch before being used, and a space of at least 10 per cent should be left in each to allow for expansion of the liquid.

The drums should be packed in strong wooden cases (which should be perforated) with not more than two drums in each case, each drum being in a separate compartment of the case. The gross weight should not exceed 2 cwt.

It should be carried as deck cargo only, the utmost care being taken to protect it from the rays of the sun, lights, or sparks: sail cloth (not black tarpaulin) is suggested as a covering.

It should be stowed apart from all other goods, whether dangerous or not, and kept at a distance from all steam pipes, funnels, or other heated objects, and from all hatchways or other openings in the deck, also from all living quarters of the vessel; and smoking in its vicinity should be strictly prohibited.

The cases containing the drums should be examined at frequent intervals (at least twice in 24 hours), during daylight, to ascertain if there is any escape; and if any leakage is detected, even by the presence of the odour above described in the vicinity of the packages, they should be immediately thrown overboard; and it is important that the person making these examinations should know that leakages sufficiently large to be very dangerous may exist without its being possible to see anything in the nature of moisture on the outside of the drums to indicate their presence.

Carbonic Acid Gas. See Gases. Acids also, page 105.

Carbon Papers.

Carbon Papers which contain fatty substances and finely divided carbon or compounds of carbon may be carried under deck as general cargo provided that they are packed in air-tight tins in a substantial outside case with special stowage and limited as to quantity in the case of an emigrant ship or in a ship carrying explosives, unless the engine- and boiler-room spaces intervene between the holds in which the explosives and this substance are carried. If packed in cases with other stationery the attention of the shipowner should be called to the fact and the case marked accordingly.

Typewriting carbon papers which are coated with wax and do not contain an oxidised oily or fatty substance may be carried on board ship as general cargo without restriction.

Carbon Tetrachloride (or Chloride of Carbon).

Carbon Tetrachloride may not be carried in emigrant ships without the permission of the Emigration Officer. In other ships it may be carried either on or under deck. For carriage below deck it should be contained in hermetically-sealed steel drums of a capacity not exceeding 50 gallons and be stowed in a cool, well-ventilated space away from all living quarters. For carriage on deck hermetically-sealed steel drums up to 100 gallons capacity may be used. In order to prevent bursting of the drums through the thermal expansion of the liquid, an air space of not less than 10 per cent. should be left in the drums when filling. As this substance has anæsthetic properties, it is essential that should a leakage occur, special precautions be taken to thoroughly ventilate the compartment before allowing persons to enter.

Carbonyl Chloride (Phosgene). This is a very poisonous colourless gas, and is carried in cylinders, which must be very carefully handled and stowed under deck in a cool well-ventilated place.

It is used in the manufacture of artificial dyestuff.

Caustic Potash (Hydrate of Potash). Provided this substance is well packed in hermetically sealed iron or steel drums, it may be carried under deck, but the drums require good solid stowage away from living quarters in a different hold to explosives.

Caustic Potash must be kept dry. The substance blisters the skin. Both Caustic Potash and Caustic Soda (v. seq.) absorb moisture from the air with development of great heat.

Caustic Soda. It is usually shipped in kegs or iron drums, and also as powder, in tins and cases. These should be carefully stowed to avoid breakage, and in a dry place, as caustic soda absorbs moisture and runs, and is liable to damage other cargo, especially woods.

Celluloid. A very hard, inflammable substance. If carried as the raw material in sheets it must be stowed on deck only. All manufactured celluloid articles should be given upper stowage near the hatch square if possible, and must be plainly marked "CELLULOID" or "PART CELLULOID."

Much "celluloid scrap" in the shape of old films is now being shipped from the U.S.A. in cases, and is always carried on deck. Great care must be exercised to keep this protected and as cool as possible, both in transit and before being discharged, as cases are usually old and in bad condition and recently several large fires have been caused by this material.

Celluloid should be packed in metal-lined cases or in tins.

Celluloid Solution. This must be carried under the conditions specified for Inflammable liquids according as to whether the solvent is alcohol or petroleum.

Chloride of Lime. See Bleaching Powder.

Chlorine:

Chlorine Gas must not be carried in emigrant ships. It may be carried in other ships provided the containing cylinders are in accordance with the recommendations of the Home Office Committee of 1895, and do not exceed 9½ inches in diameter, or 5 feet 6 inches in length, or weigh, as stowed, more than 2 cwt. each, and are protected by coir rope matting or other equally effective protection. The dimensions above-mentioned may be slightly varied, provided the cubic capacity does not exceed 4,650 inches

The cylinders must not be stowed near consignments of sodium potassium, phosphorus, copper leaf, powdered antimony, turpentine, ammonia or sal-ammoniac. It should be carried under deck in a cool, well-ventilated space.

Chloroform. An anæsthetic, which must be stowed well away from crew's quarters in sealed bottles packed in sawdust, in strong wooden cases or in hermetically sealed drums. It may be carried under deck, but it is always advisable to give stowage on deck.

See also Poisons, page 181.

Collodion Cotton.

Collodion Cotton is an explosive of Class 3, Division 2. For the purposes of the Explosives Act, 1875, collodion cotton is defined as follows :—

Collodion cotton consisting of thoroughly purified nitro-cotton, (*a*) of which not less than 15 per cent. is soluble in ether and alcohol, and (*b*) which contains not more than 12.3 per cent. of nitrogen.

It is regarded as an explosive when dry and must not be carried in emigrant ships in that form.

Where this substance is " used or manufactured with a view to produce a practical effect by explosion," it is by Section 3 of that Act an explosive in any form. In cases where it is not intended to be used by itself as an explosive, it is not regarded as coming within the meaning of the Act when it is :

(*a*) in solution in alcohol and ether,
(*b*) wet, *or*
(*c*) saturated in methylated spirit and contained in air-tight cases.

In such circumstances it will not be considered as " dangerous goods " within the meaning of Section 446 of the Merchant Shipping Act, 1894.

Collodion cotton containing 33 per cent. of moisture (the percentage being calculated on the dry collodion cotton) either loose or in the form of compressed blocks, is not an explosive and may be carried in any ship provided it is wrapped in paraffined waterproof paper and packed in a strong wooden case. If loose, the collodion cotton should be so wrapped in waterproof paper that the wrapping cannot accidentally open out.

If collodion cotton manufactured abroad is conveyed in emigrant ships, a certificate from the manufacturers and visaed by the British Consul must be produced stating that the collodion cotton has been thoroughly purified and does not contain a mercury salt or other ingredient capable of masking the Abel heat test ; what percentage of moisture it contains, the percentage being calculated on the dry weight of the cotton ; and in what manner it is packed.

Collodion, Crude. A highly inflammable liquid which must be carried on deck and kept cool.

Comburite. Same conditions as Sodium Peroxide (q.v.).

Crackers, Christmas. These must be packed in strong wooden cases, and be given special stowage. If the snaps are carried alone, they must be in tin-lined cases.

Cresol. An oil obtained from coal tar, and a more powerful disinfectant than Phenol. As cargo it should be treated as Phenol (q.v.). The disinfectant Lysol is a solution of Cresol in soap and water. **A dangerous poison.**

Creosote (and Creosote Salts). Usually of yellow or brownish colour with a powerful persistent odour. An inflammable liquid carried in barrels and drums, and should be in an isolated place

The hold in which creosote has been carried must be deodorised before shipping other cargo. Creosote is frequently carried in bulk by tank steamers.

Creosote which is obtained from wood tar contains phenol, creosol, phlorol, guaiacol, and cresol—all poisons and frequently referred to as Creosote Salts.

Cyanamide of Calcium. See Calcium Cyanamide.

Cyanide of Potassium. See Potassium Cyanide.

Dichlorethylene. May be carried under the same conditions as Carbon Tetrachloride (q.v.).

Dye. Materials used in the manufacture of Dyes:

Dinitrobenzol (wet pellets).
Dinitrotoluol (solid)
Dinitrotoluol (liquid)
Dinitrobenzol.
Metaphenylenediamine.
Metatoluylenediamine.
Mirbane Oil or Nitrobenzol.
Orthonitrotoluol.
Orthotoluidine.
Paranitrophenol.
Paranitrotoluol.
Xylidine.

The above articles should be carried in **wet** casks or hermetically-sealed drums. They must be given special stowage well away from foodstuffs, or any article liable to be damaged by leakage.

See also Dyestuffs, page 59.

Enamel Black. Stowage as for Alcohol Compounds (q.v.), page 194.

Ether. A highly inflammable liquid the vapour of which forms an explosive with air. This article must be stowed on deck only in a cool place.

Ether may not be carried in emigrant ships without the permission of the Emigration Officer.

In all cases ether must be carried on deck only, and should be contained in strong stoppered bottles packed in sawdust in a strong wooden case or in hermetically-sealed drums not exceeding 10 gallons capacity.

In order to prevent bursting of the drums through the thermal expansion of the liquid contained in them, an air space of not less than 10 per cent. should be left in the drums when filling.

Ethyl Chloride. An inflammable liquid which must be carried on deck only. The drums packed in cases should be kept as cool as possible and protected from the heat of the sun.

Felt, Asphalt Saturated, Roofing and Asphalted Cloth.

Felt, Asphalt Saturated, Roofing and Asphalted Cloth may be carried in emigrant ships by permission of the Emigration Officer, but in all cases whether carried in emigrant or other ships a certificate from the manufacturer must be obtained to the effect that the material does not contain any ingredients which would tend to spontaneous combustion and also that it has been allowed properly to dry and harden.

No definite rule is laid down for the stowage of sheathing and roofing felts, but it is advisable that they should, if carried under deck, be stowed in the square of the hatchway, and should be mentioned in the Master's letter so that they can be jettisoned in case of fire.

In 1903 a fire occurred on board a vessel which carried two consignments of felt, viz. one of black sarking felt, made from flax waste, coal tar and coal tar pitch, and the other of brown sheathing felt, made from jute waste, Archangel tar and resin. The two consignments were stowed together, and the fire was clearly due to spontaneous combustion. The Board were advised that there was nothing in the ingredients of either felt which would predispose them to spontaneous combustion ; that the black felt made from coal tar and pitch was quite safe ; but that if the rolls of brown felt were packed in the hold of a ship before they had cooled to the temperature of the surrounding air, there would be a risk of spontaneous firing.

"Asphalted Cloth" should be carried under the same conditions as tarred roofing felts.

Felt, Inodorous.

Felt, Inodorous, must not be carried on emigrant ships. When carried on other vessels it should, if stowed under deck, be placed where it is easily accessible ; it should on no account be treated as general cargo and covered with other goods.

Inodorous felt is generally made from the refuse of flax and jute previously moistened by mixture with oils of various descriptions, including paraffin. At a special meeting of the Felt Makers' Association in London, January, 1885, attention was called to the frequent occurrence of spontaneous combustion in inodorous felt on board ship, and the following resolutions were unanimously adopted :—

> 1. That inasmuch as inodorous felt is liable to spontaneous combustion, in future no inodorous felt be shipped to foreign ports.
>
> 2. That the following notice shall be placed on all letters relative to inodorous felt for shipment abroad. "Inodorous felt being liable to spontaneous combustion should not be shipped for transmission abroad, but if you wish to do so, please see the Merchant Shipping Act, 1873, Sec. 23 and 24." [Now Sec. 446, 447 of M.S. Act of 1894.]
>
> This notice to be printed in red and pasted on the invoice of all orders where there is the slightest suspicion that it is intended for transmission abroad.

It was also subsequently agreed to mark prominently on each frame the words "Inodorous Felt" in red letters 1¾ inch long.

Inodorous felt should not be confounded with tarred roofing and sheathing felts, from which it can generally be distinguished by its lighter colour.

Ferro-silicon.

Ferro-silicon.—Shipowners are warned that the carriage of ferro-silicon with a percentage of more than 30 and less than 70 per cent. (*i.e.* of grades between 30 per cent. and 70 per cent.) of silicon is dangerous, and no precautions can be advised as being adequate to ensure safe carriage. It is therefore of the utmost importance that the accurate marking and description of the ferro-silicon sent for shipment should be insisted on.

Ferro-silicon containing not more than 15 per cent., or not less than 80 per cent. of silicon is not dangerous and may be carried on any ship as ordinary cargo, provided that the certificate is produced with each shipment stating that the ferro-silicon does not contain a percentage of silicon between 15 per cent. and 80 per cent.

Ferro-silicon containing a percentage of silicon which falls between the latter figures must not be carried in emigrant ships.

The Board are also advised that ferro-silicon produced in the electric furnace and containing not more than 30 per cent. and not less than 70 per cent. of silicon may be shipped under deck either in foreign-going cargo vessels or passenger vessels other than emigrant ships, but subject to the following conditions :—

> (1) Each consignment must be accompanied by a certificate from the maker or shipper stating the percentage of silicon it contains, and that, after manufacture, it was either broken into pieces of a size in which it is usually sold (about two to three inches square) or crushed to fine powder, and so stored under cover, but exposed to

the air for not less than ten days before being dispatched from the works.

(2) It must be packed either in strong wooden cases or barrels, or if finely powdered in terne plate iron or steel drums of .6 mm. thickness and not exceeding gross weight of 2 cwt.

(3) The packages must be clearly marked with painted or branded letters with the word "Ferro-silicon," the percentage of silicon, and the words "To be stowed in a dry, well-ventilated space." Each package should also be marked with the name of works and name and address of agent in the United Kingdom, or alternatively with a distinctive symbol to indicate the identity of the manufacturer, in which case the method of marking together with the name of the manufacturer must be communicated to the Surveyor for the confidential information of the Board of Trade.

(4) Ferro-silicon must not be stowed under deck immediately beneath a living space, or in any compartment which is not separated by a water-tight bulkhead from parts of the vessel occupied by passengers or crew, or containing explosives or foodstuff or other cargo liable to damage by poisonous gases.

In wooden vessels and small Home Trade vessels where the conditions of Clause 4 cannot be carried out, the packages containing ferro-silicon must be carried on deck.

Films. These should be specially packed in zinc or tin-lined cases and given special stowage. See also Celluloid.

Fire Lighters. If made of resin and wood or cork, may be carried under the same conditions as safety matches.

Gases. Gases can only be carried in cylinders, and these cylinders are required to pass the test of the Board of Trade, and with this certificate should cause little anxiety.

The cylinders should be encased in rope and sacking, and stowed in as cool a temperature as obtainable, and in such a way that movement is impossible. The following gases may be so carried: Ammonia, Carbonic Acid, Chlorine, Hydrogen, Nitrous Oxide, Oxygen, and Sulphur dioxide.

It should be emphasised that cylinders containing gas should on no account be accepted as cargo without the written authority that the cylinders are safe within the meaning of the conditions as laid down by the B.O.T.

Gasolene. Same conditions as Petroleum spirit (q.v., page 138)

Graphol. Same conditions as Inflammable Liquids (q.v.)

Gutta Percha Solution. The solvent for the rubber is either an inflammable liquid or an anæsthetic. In the former case the liquid is alcohol and should be stowed as such; in the latter case stowage should be in well-ventilated spaces away from living quarters.

Holmes Lights. Carriage as for Calcium Phosphide. When carried for use in emergency must be stowed in a dry locker apart from other distress signals.

Hydrochloric Acid (Muriatic Acid). A very corrosive acid which fumes in the air. The acid is contained in carboys properly packed in crates with chalk and straw and carried on deck. See also Acids, page 109.

Hydrochloric Acid Gas.

Hydrochloric Acid Gas must not be carried in emigrant ships or in ships carrying explosives.

It is a highly explosive gas, a very slight rise in temperature causing a violent explosion.

Shippers should be asked to produce a certificate to the effect that the recommendations of the Home Office Committee of 1895 on gas cylinders have been complied with and that the cylinders have been tested within the last two years. The cylinders must be carried singly and encircled by coir rope matting or other equally efficient protection. They should be stowed under deck in a cool, well-ventilated space.

Hydrocyanic Acid Gas.

Hydrocyanic Acid Gas must not be carried in emigrant ships. In ships carrying explosives it may only be carried if the engine-room and boiler-room intervene between the holds which contain the explosives and the gas.

It is intensely poisonous, with an odour of bitter almonds that is not perceptible to many people. Even in a diluted state it causes paralysis of respiration and of the spinal cord and deep insensibility. It is highly dangerous for use on board ship unless it is expelled from all compartments by use of windsails, in addition to the opening of hatchways, etc. The danger is increased by the imperceptibility of the gas.

Shippers should be asked to produce a certificate to the effect that the recommendations of the Home Office Committee of 1895 on gas cylinders have been complied with and that the cylinders have been tested within the last two years. The cylinders must be carried singly and encircled by coir rope matting or other equally efficient protection. They should be stowed under deck in a cool, well-ventilated space.

Hydrofluoric Acid. A powerfully corrosive acid which must be taken on deck only. The acid will attack almost anything, and can only be kept in rubber or leaden containers.

See also Acids, page 109.

Hydrogen Peroxide.

Hydrogen Peroxide is a transparent, colourless liquid. Its oxidising properties are great, and it expands rapidly with a rise of temperature.

It may be carried in any ship if the following conditions are complied with :

The Peroxide of Hydrogen should be in solution guaranteed to be of not greater strength than 6 per cent. It must be given special stowage, and contained in strong hermetically-sealed drums or strong, sound casks with at least 10 per cent. of air space in the receptacle.

Higher percentages must not be carried in emigrant ships under any condition, and in ships carrying explosives, percentages greater than 6 per cent. must not be carried unless the engine-room and boiler-room intervene between the holds containing this and the explosives.

Hydrogen Peroxide in solution of a strength up to 40 per cent. may be carried on deck if stowed away from all living quarters and artificial sources of heat and not exposed to the direct rays of the sun. It must not be stowed in proximity to organic substances generally, particularly powders, resinous substances, oils or other cargo likely to give off organic vapour.

It must be contained in carboys or other suitable containers fitted with effective outlet valves, and at least 10 per cent. of free air space must be left above the liquid. The container must be firmly packed in iron hampers and the space between the container and hamper filled in with either straw, wood-fibre, kieselguhr or earth which is known to be free from organic matter. If kieselguhr is used, it must be retained in position by a fixed iron collar or by sacking soaked in a strong solution of sodium silicate and partially dried. This sacking should be placed over the neck of the carboy in such a manner as to fit tightly over the neck, pass over the top of the iron hamper and be securely fastened. This will also serve to protect the upper part of the carboy. The hamper must be enclosed in a suitable strong outer package.

No package containing 40 per cent. solution must exceed a gross weight of 3 cwt., nor contain more than 13 gallons of the liquid.

The packages must be plainly marked as required by Section 446 of the Merchant Shipping Act, 1894, with the nature of the contents and in addition with the words "'DANGEROUS.' To be stowed away from sources of artificial heat and organic substances, oils, etc."

Should a package break, the hose should be immediately played upon it to prevent the liquid drying in its concentrated state on wood or any fibrous material.

If the shipment of solutions of over 40 per cent. is contemplated, the suggested packing should be submitted to the Board of Trade for approval.

India Rubber Solution. See Gutta Percha Solution.

Inflammable Liquids.

It must be noted that the carriage of these liquids on vessels carrying explosives is controlled by bye-laws of the various local authorities, and that their transport on vessels containing Indian stores is governed by special regulations of the India Office. The more important liquids are enumerated in the following list.

Alcohol. Methyl alcohol (or wood spirit), Ethyl alcohol (spirits of wine, potato spirit), Butyl alcohol.

These liquids are carried under exactly similar conditions to those in use for Petroleum spirit (q.v. page 138).

Alcohol Compounds. This name includes all compounds in which alcohol is a constituent, e.g., varnishes. They should be contained in hermetically sealed tins or stone jars and packed in sawdust in strong wooden cases. These cargoes may be carried anywhere with special stowage. The liquids are also shipped in sound casks and steel drums or barrels.

Acetal. Treat as Alcohol (q.v.).

Acetone. As for Alcohol and Petroleum spirit (q.v. page 138).

Ether. **Most dangerous.** Vapour very heavy and highly inflammable. Must be carried on deck only and kept as cool as circumstances will permit. The liquid is contained in strong stoppered bottles packed in sawdust in strong wooden cases, or preferably hermetically sealed drums. Ether must be protected from the heat of the sun.

Tar Oils. Contained in strong casks or steel drums, may be carried below deck. See page 142.

Turpentine. See Oils, page 146.

Petroleum Compounds. These include liquid metal polishes, boot creams, turpentine substitutes, and products of petroleum. If packed in tins contained in strong cases, may be carried in any place of special stowage.

Marking of Inflammable Liquids. In all cases the name ot the substance and the Flash Point must be clearly stencilled on the outside of the packages.

Lime, Chloride of. See Bleaching Powder.

Lycopodium. A very light powder, the spores of the club moss. It is quite harmless in itself. If, however, the powder becomes scattered in the air the finely divided particles are liable to spontaneous combustion.

Lythene. Same conditions as Petroleum spirit (q.v.) page 138.

Matches. In general, matches should be packed in metal lined cases and given special stowage. Certain brands approved by the B.O.T. may be carried in wooden cases containing up to 50 gross in packets of 1 dozen. The nature of the contents must be clearly marked on the outside of the cases.

Methyl Alcohol. See Inflammable Liquids.

Methylated Spirit. The commercial form of Alcohol. See page 194.

Mineral Oil. This must be carried under the same conditions as Petroleum spirit (q.v.) page 138.

Mirbane Oil. See Dye and Oils, page 134.

Muriatic Acid. See Hydrochloric Acid.

Naphtha. See Petroleum Spirit, page 138.

Nitre, Sweet Spirit of. An alcoholic solution (90%) of ethyl nitrite. A very volatile and inflammable liquid which must not be carried below deck in passenger vessels, and must be stowed in a cool well ventilated place.

Nitric Acid. A very corrosive acid which must be carried on deck well away from other acids or inflammable articles. The carboys should be packed in cases surrounded with earth.

See also Acids, page 110.

Nitrolim. See Calcium Cyanamide.

Oleum. A name sometimes used for fuming Sulphuric Acid (q.v.).

Oxalic Acid. A very poisonous crystalline solid which should cause no anxiety if properly packed.

(See also Poisons, page 181 and Acids, page 110.)

Oxylithe. Same conditions as Sodium Peroxide (q.v.)

Paints, etc. As paints, varnishes, etc., are mixed with inflammable liquids, such cargo must be considered dangerous. Packed as they are, however, in drums and stowed by themselves, they are harmless.

In the case of fire all paints, etc., are highly inflammable; and should therefore be stowed in a place of easy access in case of emergency.

Under this head might be included Brunswick Black, Liquid Metal Polishes, Boot Creams, Enamels, and similar articles.

See also under Paints (page 83), and Lac (page 74).

Paraffin Oil. See Oils, page 138.

Paris Green. A mixture of Arsenite and Acetate of Copper used as an insecticide on growing crops. Poisonous. Packed in strong casks or drums, should be stowed well away from foodstuffs.

Phenol. **A dangerous poison** which readily burns the skin. Take special precautions against leakage, as crystals readily liquify. It should be shipped in earthenware vessels, securely packed in cases with sawdust, or in metal drums packed in wood casing and sawdust. Must be stowed well away from all foodstuffs and preferably on deck.

Phosgene. See Carbonyl Chloride.

Phosphoric Acid.

Phosphoric Acid, Specific Gravity 1.750, may not be carried in an emigrant ship without permission of the Emigration Officer.

It may be carried under deck in cargo or passenger ships if contained in strong stoppered 10 lb. bottles packed with straw in strong wooden cases with not more than six bottles in each case or in hermetically sealed jars or carboys each containing not more than four gallons, each wrapped in straw, and two such jars packed in a strong wooden case tightly packed with straw. *Phosphoric Acid of a lower specific gravity* is much more corrosive, and if shipment overseas is contemplated, the suggested packing should be submitted to the Board of Trade for approval.

Phosphorus, Yellow, Stick. This must be carried on deck, but not at all in vessels carrying explosives. Yellow phosphorus spontaneously ignites on contact with air, and therefore must be packed in containers completely filled with water and hermetically sealed. The fumes produced by combustion are deadly poisonous.

Phosphorus, Amorphous, and Sulphide of.

Phosphorus, Amorphous, and the Sulphides of Phosphorus Amorphous, or Red, or Schrotter's Phosphorus may not be carried in emigrant ships without the special permission of the Emigration Officer. This substance is wholly distinct in its physical characteristics from ordinary or yellow phosphorus. It is a dry powder which does not need to be kept under water as in the case of ordinary phosphorus, is not liable to spontaneous combustion and does not take fire in air until it is heated to 260° C. or 500° F.

This, although a low temperature as compared with most other substances, is, nevertheless considerably above the temperature of the ignition of dynamite or similar explosives, as well as that of most varieties of matches. It is a temperature which on board ship would not be reached except through fire.

In other than emigrant ships, no objection need be taken to its stowage below deck, provided it is packed in tins.

Shipments are usually made in tins containing 10 or 11 lb. each, ten of these tins being tightly packed with sawdust in a strong wooden case. There is no objection, however, to tins with greater or less capacity, but the weight should not be greater than 28 lb. unless stronger containers, such as iron drums, are used.

The precautions taken with regard to the shipment below deck of amorphous phosphorus will be quite suitable in the case of Sesquisulphide of Phosphorus (or Scarlet Phosphorus) and Pentasulphide of Phosphorus and no danger connected with the carriage of either of these two substances need be anticipated provided the compound is packed in air-tight vessels.

The sulphides of phosphorus slowly evolve sulphuretted hydrogen, and on this account the vessels containing them should be closed efficiently and the package should be readily accessible for removal in case of need. The gross weight of the packages containing the sulphides must not exceed 2 cwt.

Picric Acid.

Picric Acid or trinitrophenol in its dry state is an explosive in Class 3, Division 2, and must not be carried in emigrant ships. In other ships it may be carried under deck without a magazine if the following conditions are complied with, viz. :—

(1) It must be packed in accordance with Order of the Secretary of State No. 7, dated 10th June, 1904.

(2) It must be stowed in a cool place away from boilers and away from strong mineral acids, paints and inflammable liquids and not in contact with lead.

(3) Each package must be marked as follows :—

"Explosive Class 3, Division 2.
Picric Acid.
To be stowed away from boilers, also
strong mineral acids, paints, etc., and
not in contact with lead."

(4) The quantity in any one hold or compartment must not exceed 10 tons.

When mixed with not less than half its own weight of water, Picric Acid is exempt from the provisions of the Explosives Act.

It may be carried under deck in ships other than emigrant ships provided it is contained in packages of sufficient strength to prevent any of the contents escaping when subjected to rough usage, and is given "Special Ammunition Stowage" in a cool space, and not in contact with lead.

Quantities up to 20 tons may be carried in any one compartment.

Each package must be marked as follows :—

"Picric Acid
(With the percentage of water).
To be given 'Special Ammunition Stowage'
in a cool space away from stores, mineral acids,
paints, etc., and not in contact with lead."

Potash, Chlorate of.

Potash, Chlorate of, must not be carried in emigrant ships except as stated below in paragraph 5.

This substance, although by itself incombustible, is a far more intense supporter of combustion than saltpetre. Some of the mixtures of combustible matters and chlorate of potash are liable to spontaneous combustion and all such mixtures are sensitive to percussion, especially when combined with friction. Moreover some chemicals have a very violent action on this substance, and many mixtures of combustible substances and chlorate of potash are set on fire if acted on by strong sulphuric acid.

1. It must be packed in iron or steel drums or small paper-lined kegs or tin-lined cases of sufficient strength to prevent any escape of the contents.
2. Must not be stowed in the same hold with combustible materials.
3. Must not be stowed in the neighbourhood of strong mineral acids, especially sulphuric acid, and all precautions must be taken to prevent any escaping acid from reaching the chlorate.
4. Not more than 10 tons of chlorate of potash should be carried in one hold. If, however, a compartment in a cool part of the ship is reserved for this substance and such compartment be thoroughly cleaned of all foreign matter, grit, dust, etc., and the packages stowed in such a manner that there will be no friction, the limit of 10 tons in any one hold may be exceeded, if specially authorised by the Mercantile Marine Department of the Board of Trade.
5. In medicinal quantities packed in small bottles contained in cases with sawdust, it may be carried below deck in emigrant ships if stowed to the satisfaction of the Emigration Officer.

Potassium Cyanide. A deadly poison. The drums must be well constructed, hermetically sealed, and carefully handled.

The solid gives off fumes of prussic acid. Very special stowage, well away from all foodstuffs and living quarters.

See also Poisons, page 181.

Potassium Sulphide.

Potassium Sulphide and *Sodium Sulphide* may not be carried in emigrant ships without the permission of the Emigration Officer.

The sulphides of sodium and potassium in the dry or anhydrous form are liable to spontaneous combustion and should be packed in strong air-tight vessels, such as steel drums. When so packed they may be stowed below deck even in a vessel carrying explosives.

In the hydrated condition, the sulphides of sodium and potassium are not liable to spontaneous combustion and no objection need be raised by an Officer of the Board of Trade to their shipment on this account.

If not fully hydrated (*i.e.* containing at least 50 per cent. of water) these substances may be carried on board ship without special restrictions as to stowage except as stated below, provided they have been manufactured in such a way as to make the presence of free sulphur practically impossible, and provided they are packed, either fused or in cakes (but not broken up), in strongly made, hermetically sealed iron drums in which special precautions have been taken to leave as little air space as possible.

All sulphides of sodium and potassium should be stowed so that they may not come in contact with acid.

Pyroxylin. This is Guncotton (q.v.)

Schist Oil. See Shale Oil, page 138.

Shale Oils. See Oils, page 138.

Sheep Dip (Liquid). This must be packed in strong casks, or iron and steel drums, and stowed in a cool place well away from crew's quarters. The B.O.T. requires that this cargo shall be plainly marked **"Poison: not to be stowed with Foodstuffs."**

Soda, Caustic. See Caustic Soda.

Sodium Chlorate. Same conditions as Potash, Chlorate of (q.v.).

Sodium Cyanide. Same conditions as Potassium Cyanide (q.v.).

Sodium, Metallic. This metal must be packed in jars or drums completely filled with mineral oil. Special precaution must be taken that the metal does not come into contact with water. The containers packed in strong wooden cases may be carried below deck.

Sodium, Peroxide (or Sodox). This becomes an explosive if brought into contact with any combustible article. Packed in stout metal drums, should give little trouble. It must be kept dry.

Sodium Sulphide. See Potassium Sulphide.

Spirits of Wine. See Inflammable Liquids.

Sulphur Dioxide. A pungent suffocating gas which is neither combustible nor explosive. The gas acts as a bleaching agent. Most frequently used as a solution in water called Sulphurous Acid (q.v.). See also Gases.

Sulphuric Acid. This is a highly corrosive acid which should be carried on deck only.

The acid can be carried with safety under deck if a layer of slack coal, not less than one foot in depth, is laid at the bottom of the hold and carefully levelled off. Then a tier of drums should be stowed upon it, and when the first tier is completed, additional coal should be added and levelled off (slack coal known as "breeze," "smithies," "smalls," or such trade types of coal can be used for this purpose). A further tier of drums can then be laid, and the process of filling in with the small coal again resorted to, and so on to a height of as many as four tiers.

In the event of leakage, coal even in a powdered state will not evolve heat by reason of the presence of sulphuric acid, and the marketable condition of only so much of the coal as is wetted by the sulphuric acid is affected.

The possible results that may be anticipated as regards spontaneous combustion in a cargo of coal on the surface of which drums of sulphuric acid have been embedded, are:—

(1) If the sulphuric acid escapes into the coal, spontaneous combustion will not take place within the region of the leakage.

(2) If the spontaneous combustion takes place first, then the rupture of the drums, and consequent escape of the sulphuric acid, will retard or extinguish the fire by the production of sulphurous acid vapour in which combustion cannot be sustained. This gas has a pungent odour and a strongly suffocating effect, so that great care should be taken to keep away from it.

Any coal that has been wetted with sulphuric acid should not afterwards be used.

It is the practice at some ports to stow sulphuric acid in a compartment by itself on a layer of chalk, but the leakage of sulphuric acid on the chalk would produce carbonic acid gas, a heavy odourless gas which it is dangerous to inhale, and which gives no warning of its presence. For these reasons, the ventilation of a space where this practice is followed should be carefully attended to before any person is allowed to enter the compartment, the down cast being carried as low as possible.

It is recommended that wherever sulphuric acid is carried under deck, the precautions indicated above should be observed, but it is of course to be understood that drums of sulphuric acid should not be stowed on coal known to be specially liable to spontaneous combustion.

If sulphuric acid is carried as deck cargo, the containers should be so stowed as to be safe and secure, and readily jettisoned in case of danger and so that neither the stability of the ship nor the free communication of the crew on the deck is dangerously interfered with. The containers should not be of greater gross weight than 2 cwt.

Sulphuric acid may also be carried on deck only, if packed in cases each containing four 2½-gallon jars packed in whiting. The gross weight of each case should not exceed 3 cwt.

See also Acids, page 111.

Sulphurous Acid. A solution in water of Sulphur Dioxide (q.v.). The acid should be shipped in carboys, properly packed in crates. The acid gives off fumes which are suffocating, and acts as a bleaching agent. Stow away from crew's quarters and other cargo. See also Acids page 111.

Tar. A black liquid obtained from the destructive distillation of wood and coal and used for many purposes. It is an inflammable article which is contained in casks.

Full cargoes require good stowage, owing to the liability of the casks to leak and choke the bilges.

It is advisable to sprinkle sawdust on the floor, and this will cause any leakage to clog. On no account must tar be stowed in the same place as articles of an edible nature or stowed above any articles liable to be damaged by any leakage.

Tar is now often shipped in bulk in tank steamers.

See also Tar and Tar Oils, page 141.

Toluene. This is a very inflammable liquid. Treat as Benzine.

Turpentine. See Oils, page 146.

Vitriol. See Sulphuric Acid.

Wood Alcohol. See Inflammable Liquids.

Xylol. Inflammable liquid, same conditions as Petroleum Spirit (q.v.) page 138.

Xylonite. Same conditions as Celluloid (q.v.).

Zinc Dust. Should be packed in hermetically sealed drums and stowed in a dry place away from acids. Each drum to be marked "**Zinc Dust—Dangerous if not kept dry—Stow away from Acids.**"

The articles enumerated in the foregoing pages are those generally considered as dangerous—that is they are a source of danger to life and vessel, and require special treatment for transport.

Many substances are perfectly harmless in themselves, but may prove a source of danger in the event of an outbreak of fire. A conflagration is assisted by the presence of oxygen, and hence chemicals rich in oxygen would effectually feed the flames. Chlorates and Nitrates, in particular, would assist a fire. In the presence of heat such substances, otherwise quite harmless, would yield oxygen and cause a smouldering fire to burn vigorously. Such chemicals are not, strickly speaking, "dangerous cargo," and require no special stowage. If, however, "ates" are to be carried in a general cargo, arrange so far as possible that such cases, kegs, bags, etc., are easily accessible so that, in emergency, they may be removed to safer quarters if desired.

One cannot expect the Master of a vessel to be familiar with the peculiar behaviour of each and all of the multitude of cargoes entrusted to his care.

It must therefore be recognised that the consignors must, in their own interests, and for the common good of all, render every possible assistance to the Master of the ship by giving him the fullest instructions concerning the nature of the cargo, and, if possible, directions for stowage.

CHAPTER V

CARGO DAMAGE

In this chapter it is our intention to deal only with damage to cargo, unless under special circumstances, where possibly damage to the ship may have occurred through the stowage of the cargo.

It is extremely difficult to separate as well as enumerate the various kinds of damage that may occur to cargo during its handling and carriage overseas. But we have endeavoured to deal with the matter fully under the following headings:

1. Damage caused before shipment.
2. ,, ,, in loading.
3. ,, ,, by lack of dunnage.
4. ,, ,, ,, crushing.
5. ,, ,, ,, chafage.
6. , ,, ,, change of temperature.
7. ,, ,, ,, contamination.
8. ,, ,, ,, wet or moisture.
9. ,, ,, ,, inherent vice.
10. ,, ,, ,, cargo shifting.
11. ,, ,, ,, pilferage.
12. ,, ,, ,, fire.
13. ,, ,, ,, vermin.
14. ,, ,, ,, bad stowage.
15. ,, ,, during discharge.

(1) DAMAGE CAUSED BEFORE SHIPMENT

It often occurs that cargo may be damaged in transit from the place of origin to the vessel in which it is to be transported. We do not propose to enter into any suggestions as to how this may take place, or be avoided, but propose to deal only with damage caused to cargo after it is received for shipment. It is highly important that all those concerned in the receiving of cargo for shipment should exercise the greatest diligence to see that it is in good order and condition; and if otherwise, to be sure that the receipts are duly qualified according to the condition in which the cargo is received; for once the Bill of Lading is signed in accordance with the receipt given, the vessel is then responsible for the delivery of the cargo in like order and condition.

It is often difficult to detect damage to cargo at the time of shipment, and it should be borne in mind that if any doubt exists as to the nature and condition of the goods shipped, this should be mentioned on the receipt given.

(2) DAMAGE CAUSED IN LOADING

Cargo may be damaged in several ways during the process of loading, by rough handling, breakage of gear, weather, etc.

As far as handling is concerned, this almost entirely depends on the method of slinging, or placing the cargo in the sets. In many cases where the men are paid by results, that is, by piecework, the tendency is to make up very heavy sets, and consequently cargo is damaged in this manner.

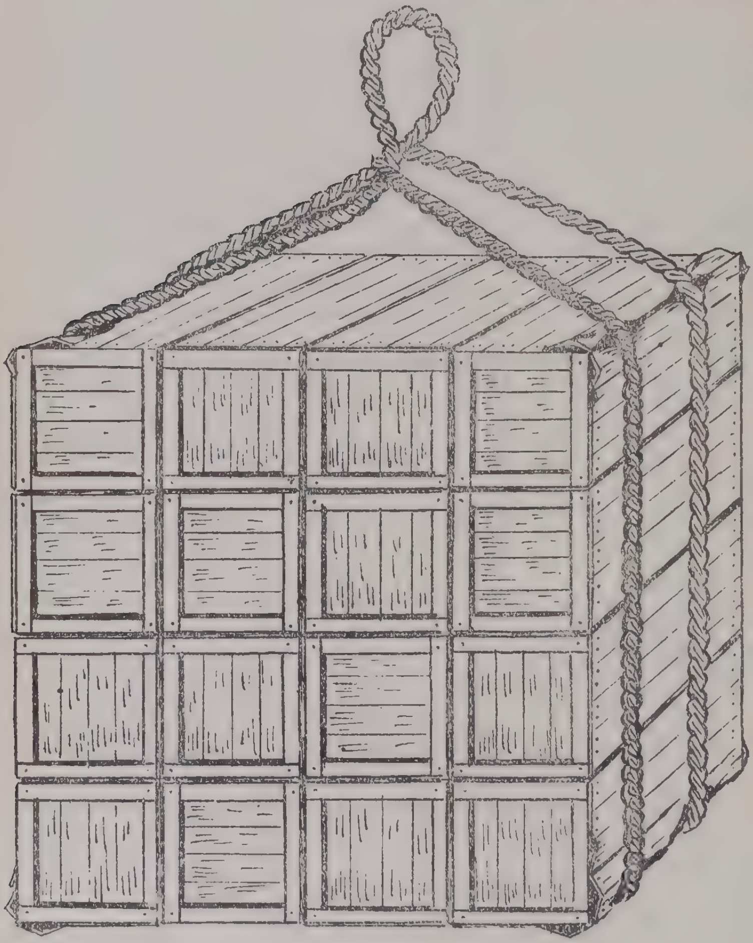

Fig. 29
Cases Incorrectly Slung

All light, bulky cases should, of course, be handled with rope slings, and such cases as fruit, milk, etc., should be hoisted on proper boards or trays.

Fig. 29 shows a sling of light cases made up incorrectly, illustrating how the tightening of the sling has broken the boards of the cases. Fig. 30 shows a set of the same cases made up in a more suitable manner. Putting fewer cases in the sling and building them up in the form of a pyramid will reduce the damage to a minimum. (See also Cases, page 18.)

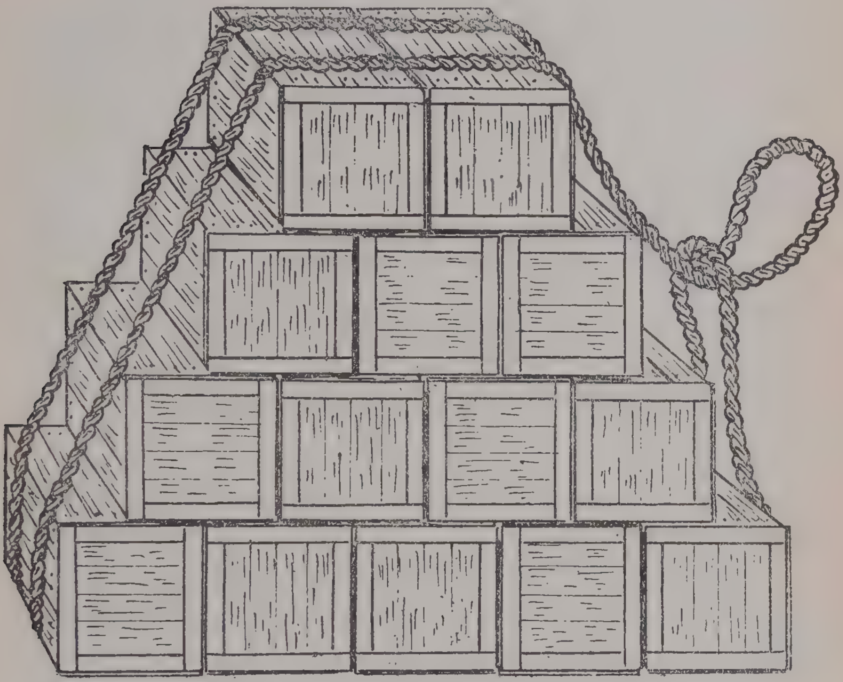

Fig. 30
Cases Correctly Slung

Barrels or casks should never be hoisted with can hooks, unless they are strong, well made casks with good chimes, in which case they are more safely handled in this way than any other.

As regards weather damage during loading, much depends on circumstances ; " slight rain " would not affect some cargo such as case goods ; whereas, even the slightest rain would probably damage cargo such as steel plates, rods, etc., as the dampness would cause rust during the voyage. Therefore one must be very careful to discriminate as regards what cargo should be loaded if the weather is at all damp.

It is the policy in many ports to continue loading in wet weather through tents. We consider this a bad practice, as although only a few drops of water may reach the cargo, the goods may be of such a nature as to be completely ruined; and one has to remember that cargo, no matter how slightly wet it may be, has to remain in this condition during perhaps a long passage.

(3) DAMAGE CAUSED BY LACK OF DUNNAGE

The bulk of damage to cargo nowadays is undoubtedly attributable to lack of dunnage, or to this being unsuitable or wrongly placed. In our view sufficient care and attention is not paid to this important matter, and much damage to cargo which has been claimed as "sea damage" might have been avoided if more consideration had been given to the question of dunnaging the vessel.

As an example of this we had a case recently where some bags of very fine hides arrived in **apparent** good order and condition, but it was afterwards found that there were some slight rust stains on some of the hides. This did not show until they were partially tanned, when all the rust came out in big spots, and there was in one case a complete impression of the rivet heads, and the edge of a plate where the bags had been allowed to touch a butt strap.

Articles like hides are often injured in this way by being stowed on barrels without dunnage being used and becoming damaged by the rusty hoops.

We might mention another case with a cargo of linseed in which the sides of the ship were well dunnaged; in fact the vessel appeared well dunnaged throughout, but owing to excessive condensation occurring, the sweat ran out on the tween decks where there was **"insufficient dunnage,"** and so the lower tier of bags were damaged, and heavy claims resulted. We have no hesitation in saying that there was far more dunnage in the vessel in this particular case than was necessary, but it was **incorrectly placed.**

On page 34 we have written on dunnage, and have there given our views as to how dunnage should be laid and the quantity and nature to be used, etc.

(4) DAMAGE CAUSED BY CRUSHING

One often finds in discharging a cargo that certain packages are badly damaged by crushing. This may occur in various ways. It may be by a shift of cargo, where heavy goods have moved and crushed cargo of a lighter nature stowed between them; or it may be that the excessive weight of goods stowed above other cargo has caused the lower packages to collapse; possibly the lower portions of cargo have not been sufficiently rigid, or dunnage boards of insufficient thickness and strength have been used in stowage.

As an instance of this we may mention a case of a vessel which had bales stowed in the midship part of a hold, and heavy cases in the wings, and above this boxes of fruit were stowed. Owing to the bales not being rigid, the boxes of fruit sank into the sagged bales, and many in the upper tier were crushed laterally.

In another instance a considerable amount of cargo was stowed on top of cases containing motor-cars. Some of the cases in the upper tiers were smaller in width than the motor cases stowed beneath them, with the result that the tops of the motor cases were crushed in.

Again, where an uneven tier of irregular sized cases had been boarded over to make a level platform on which to stow lard, the boards were not sufficiently strong, and in consequence bent down over the openings between the lower tiers, with the result that where a box of lard projected over the edge of the lower cases it was badly crushed.

It may occur also that during the process of hoisting cargo from the vessel, a heavy sling or set may touch some portion of the coaming when it will be crushed by its own weight.

(5) DAMAGE CAUSED BY CHAFAGE

All cargo stowed in a vessel is subject to movement, either by vibration or the working of the vessel. This movement is so considerable that chafage is the cause of a large amount of damage to cargo, and there are few commodities which are not more or less subject to damage from this cause.

Naturally the only way to avoid chafage is to stop the movement of the cargo. As, however, it is almost impossible to do this, every effort must be made to reduce such movement to a minimum, and everything possible should be done to protect the cargo against damage by such movement.

Chafing must not be confused with " breaking " or " crushing," but must be regarded more or less as " rubbing." When stowing cargo it must be borne in mind that a certain amount of this rubbing is almost sure to go on during a voyage—especially with the outside edge and the top surface of the cargo.

In stowing goods that are particularly liable to chafe, such as bales, rolls of material, unprotected articles, etc., sufficient mats, burlap or other protecting medium must be used to prevent damage. When stowing goods like bales, chafage should be anticipated and the cargo stowed in such a manner that, if chafage did occur, the damage would be reduced to a minimum as far as the contents are concerned.

For instance, it would be better to chafe a bale or roll on its flat, where only a certain portion of its contents would be damaged, than to allow it to be chafed on the end where it would be damaged throughout.

Damage by chafage particularly occurs when goods are stowed on their edge, such as for instance with slates, some kinds of furniture, slabs of fibre, etc.

As an example we may mention a case where several packages of wall boarding were stowed on edge fore and aft between two stanchions in a tween deck. These were not sufficiently " blocked off " with the result that after a long voyage with the rolling of the vessel the whole consignment was ruined, as the top edges had been rubbing against one another to such an extent that a portion of this edge of each package was rubbed completely away.

We have also known a large bale of books to have been stowed against a hatch beam, where, with the movement of the vessel, the books had so chafed against the beam that it had cut into their backs to the extent of 2 inches, completely destroying the whole consignment.

In another case some valuable bags of a very fine seed were stowed alongside a stanchion, and, although this was covered with burlap, the bags had chafed so badly that the contents were almost entirely lost.

We give these instances as a few of many that have come under our notice to call attention to the serious damage caused by chafage.

(6) DAMAGE CAUSED BY CHANGE OF TEMPERATURE

Much damage can be done to cargo by a change of temperature, and there are two ways by which it can be affected.

Firstly, the effect such a change may have on the particular article itself in changing its nature, and secondly, by causing evaporation and/or condensation, and the effect that this would have on the separate commodities.

For example, there are many articles which, once they are overheated, no matter how quickly they may be restored to a normal temperature, will be damaged, and this damage cannot be eradicated. This applies to many articles such as lard, sweetmeats, etc. Again, when carrying refrigerated meat, etc., if there is a sudden rise of temperature, even supposing this is lowered soon afterwards, the meat, etc., will become soft during the heated period and be misshapen.

But as regards condensation, it may be that the actual cargo which has caused the evaporation will be unaffected by the subsequent condensation, such as, for instance, timber.

The only method one can adopt to avoid such damage is to give great consideration to the stowage allotted to the various portions of the cargo. And in this respect we must point out that on no account should any cargo which is liable to be damaged by heat be stowed near a stokehold or engine-room bulkhead, as we have frequently had cases where barrel cargo, such as, turpentine and oil have suffered severely through being stowed in this position.

Now that internal combustion engines are so much more frequently used in vessels and thereby doing away with boilers, little notice is taken when stowing cargo in close proximity to engine-room bulkheads, but we frequently find in this class of vessel considerable heat round the engine room casings, and this should not be overlooked.

The whole secret, of course, is ventilation, as although cargo may appear to be quite dry on shipment, with a rise of temperature evaporation will take place of any moisture that may be in the cargo, and on a sudden fall it is often liable to sweat. In other words, condensation takes place.

Usually by Bill of Lading the ship is exonerated for damage caused by sweat, but unless proper precautions are taken regarding ventilation and dunnage, claims may arise for damage which could have been avoided by taking reasonable care.

Therefore one should exercise the greatest effort to avoid sudden changes of temperature, and where it is impossible to do so, adequate precautions must be taken, as far as possible, to prevent damage. The precautions taken must be varied, of course, according to the circumstances of the case and also the nature of the cargo.

(7) DAMAGE CAUSED BY CONTAMINATION

Cargo can be damaged by contamination either by direct contact with dirt or any other substance which may damage it ; or by absorbing taint from other cargo or goods stowed in close proximity to it.

In the first place the vessel must be clean and free from odour before taking any cargo that could be damaged by dirt or taint. It is often considered advisable to wash a vessel's holds before taking cargo, but we suggest that every other means should be considered to get a vessel clean before doing this. We know it seems a simple matter, and it is no doubt easier to wash a hold than cleanse it by other means ; but our view is that it is so seldom possible to get a hold thoroughly dry. Although it may appear so on close examination one will find there is generally a considerable amount of water in the different lodgements around the hold or underneath the ceiling, inside pipe casing, etc., and also absorbed by all the woodwork in the holds. This specially applies to a vessel which has of necessity been washed out with sea water.

In some cases it is certainly necessary to wash holds, and here fresh water should be used, and all closed spaces, such as limbers, pipe casing, etc., opened where possible.

It often happens that it may be necessary to deodorise a vessel's holds after carrying a cargo which leaves a taint. There are several ways of doing this, which depend entirely on what particular taint is in the vessel.

We have found in one case permanganate of potash mixed with water very effective. If, however, other means are found to be ineffective, frequently the injection of steam into a hold will have the desired effect; but one must always remember that this will cause considerable dampness, which must be guarded against before loading another cargo.

After washing holds the bilges should be cleaned and thoroughly dried or cement washed. The practice of putting carbolic, or other disinfectant, in the bilges has great objections, as much cargo has been tainted by so doing. The practice also of coating the bilges with crude oil is highly unsatisfactory, as although this may be a preservative for the ironwork, it has led to some heavy claims being made for flour, etc., damaged by taint.

Where a ship has been carrying any bulk cargo such as ore, care must be taken to see that all the corners and crevices in the hold are thoroughly well cleaned. A steamer recently discharged a cargo of Cuban sugar, and on testing the loose sugar taken from the holds, traces of copper and arsenic were found. It was afterwards ascertained that this vessel had carried a cargo of copper pyrites previously, and although the holds appeared clean before loading, a small portion of this had apparently been lodged on her beams or behind the stringers, and this having fallen amongst the loose sugar, caused such damage that heavy claims resulted.

In our experience more damage of this kind is caused by what is termed " coal dust damage " than in any other manner. Such damage is very difficult to avoid, and in many of the older vessels where the " cross bunker " is separated by a wooden bulkhead, it is almost impossible to get this dust-tight.

If often occurs that, owing to lack of space for additional bunkers, a certain part of the tween deck or bridge space, is partitioned off by a temporary wooden bulkhead for the purpose of carrying coal. These bulkheads are a continual source of trouble, and when this method is resorted to it is very seldom that damage does not occur. Therefore, whenever it is necessary to use such a structure, every effort must be made to get it absolutely dust proof, and it must always be remembered that the slightest working or movement in a wooden bulkhead will allow coal dust to percolate through. The main point in erecting a bulkhead of wood is to see that it is properly shored, and absolutely rigid. If this condition is obtained, it is an easy matter after the seams are properly caulked, to paste thin paper over them. If this is done it will be found that the bulkhead is perfectly tight.

One frequently hears when coal dust damage occurs, that the bulkhead is strained by bad weather, and consequently the damage is considered a " peril of the sea " and paid for by underwriters. In our opinion, however, a great deal of such damage is really attributable to faulty bulkheads.

Another cause of coal dust damage is due to the ventilator cowls being left open during the vessel's bunkering operations at the various coal ports during her voyage. It is absolutely essential in all cases when a vessel calls for bunkers at any port, to see that all ventilators and other openings are closed during the period that the ship is coaling.

There is another frequent source of damage by dirt. When certain cargoes are being handled, they cause a heavy dust to settle on other cargo, thereby damaging it. See Damage caused during discharge, page 217.

Serious damage to many cargoes has been caused by their becoming contaminated by taint or odour. This can only be avoided by paying great attention to the condition that the vessel is in before loading her cargo, and also to the allocation of stowage of certain portions of the cargo in relation to one another, if one gives off a taint which is likely to effect the other.

Many claims have arisen from this cause. For example: we once found a small tin of essential oil which had been penetrated by a stevedore's hook. On taking it out of the hold a few drops leaked on to some slabs of zinc dross. These were placed in a shed in which a large quantity of flour was stored, and the result was that a considerable quantity was contaminated.

Another case was one in which a vessel in one hold had a large consignment of rolled oats and sugar, whilst in an adjoining hold turpentine was stowed. This latter suffered considerable leakage with the result that a certain amount of it penetrated the bulkhead, and the whole of the rolled oats was rendered unfit for food, whereas the sugar (white beet) was not harmed in any way.

On the contrary, in another vessel, some lubricating oil had been spilt in the tween decks where beet sugar and rolled oats were stowed, the beet sugar was damaged by taint, but the rolled oats was unaffected.

We give these instances to show how impossible it is to lay down specific rules as to what particular commodity will taint or be tainted by any other, and it is only by long experience that one can find out the various properties of many articles carried.

As it is a very serious matter, and cargo is so often damaged from this cause, we say the golden rule should be "better safe than sorry," and would emphasise that the greatest consideration should be given to stowage from the point of view of such contamination occurring.

(8) DAMAGE CAUSED BY WET OR MOISTURE

Cargo may be damaged by wet or moisture in many ways. Frequently by water gaining access to the interior of the ship; either by accident—which would be a peril of the sea—or by some other means, which might possibly have been avoided by care and attention by the persons concerned. We will first deal with the question of water entering the holds through bad weather, and this may occur in many ways. Possibly by a leak of some kind in the hull of the vessel, such as a broken rivet or a butt seam started, cracked plate, or in many other ways, or as the result of an accident such as a hatch stove in, fittings torn away from the deck in a heavy seaway, all of which circumstances could not be avoided. It is therefore of little use elaborating on these cases as any recommendation we may give would be useless. There are, however, two frequent means of water obtaining access to the holds of a vessel in bad weather, and these are: through the ventilators not being properly attended to, and (chiefly), through the hatches.

As far as the latter case is concerned it may be from one of two causes ; either the tarpaulins are not in a fit condition to keep the water out, or they are not properly battened down. We fear that many sailors do not realise the importance of efficiently battening down a hatch. It is not sufficient to appreciate that the tarpaulins are simply for use as covers for the hatches to keep the water from running in; it must be realised that they are for securing the hatches, and must resist the force of heavy seas applied to the coamings and to the battens securing the tarpaulins.

One frequently finds when examining hatches on a vessel's arrival in port that she is supplied with three or four good heavy tarpaulins, and yet on " opening up " we find water has got below. This is because they have been inefficiently battened down.

In battening down a hatch, the greatest care should be taken with the first, or lower tarpaulin, to see that it is fitted closely and tightly round the coamings, especially at the corners, which should be neatly and smoothly turned in. The succeeding tarpaulins should also be carefully turned in. but the folds laid in the opposite directions at the corners. The whole of these tarpaulins should be well wedged with battens in the usual cleats with hardwood wedges.

As regards the condition of tarpaulins, it is not necessary for us to enlarge on this point. There are so many different kinds of canvas suitable for this purpose that we naturally suppose a suitable quality will be used. In any case care should be taken that they are properly " dressed," as often after a long voyage tarpaulins will be so badly " washed " that water will quite easily run through them, and if the surface of the hatch is not perfectly smooth and any indentation exists, water will continually drip through and damage cargo.

Apart from the cargo damage arising from the aforementioned cause, namely ; entry of water into the vessel, there are still many other ways by which cargo may be damaged by wet or moisture.

It may possibly occur that some portion of the cargo is likely to heat and produce vapour, which in its turn is condensed and may cause damage to itself or other cargo stowed beneath it.

Again, cargo may be damaged by rain in loading, which in some cases perhaps is unavoidable, but should it happen that cargo is wetted by rain, on no account should it be stowed away amongst other cargo without previous drying.

Further, cargo may possibly be damaged by wet through leakage of other portions of the cargo; hence the absolute necessity of never on any account stowing wet goods, liable to leak, above cargo that will be damaged by moisture, or on the same deck where water may run along from other cargo or leakage.

As an example of this, we recently had a case where crushed oyster shells in bags were stowed in the bottom of a hold. In the same hatch were stowed wet hides, and the brine draining from these ran along underneath the bags, and when the vessel took a slight list the brine lay alongside the tunnel and seriously damaged the oyster shell. This damage being the result of nothing more than bad stowage.

Again, we might mention another case where a part cargo of cottonseed was stowed over manganese ore in bulk, which was in a more or less damp condition when loaded. The cotton seed, being of a heating nature, caused the moisture from the ore to evaporate, and this vapour, condensing on the vessel's sides and under her decks, saturated the holds with sweat. Fortunately this vessel was exceptionally well dunnaged, otherwise a large amount of cargo would have been damaged.

One must always take into consideration, when loading a mixed cargo, what moisture any particular commodity contains, and allowance must be made for this moisture to dry out or evaporate without damaging adjacent cargo. As an example of this, we know of a case where a lower hold was filled with pitch pine logs which had been taken on board wet from rafts. Naturally it was supposed that as these wet logs were stowed separately in the lower hold no harm would be done, but in the shelter deck right underneath the deck head there was a consignment of canned goods. As the vessel proceeded through the tropics, the wet from these logs was evaporated, and condensed on the lower side of the deck, ran down on top of the cases and penetrating to the tinned goods, loosened the labels and rusted the tins. This resulted in a heavy claim. The obvious precaution that should have been taken in this case, was to have battened down the wet logs in the lower hold, or to have enabled the steam to rise out of the hatch instead of allowing it to condense under the deck.

Numerous illustrations of such cases could be given; but we can only say that damage by sweat can best be avoided by anticipating it, and paying particular attention to the dunnage and ventilation, and taking all other necessary precautions—whether the cargo is likely to sweat or not.

(9) DAMAGE CAUSED BY INHERENT VICE

It is generally impossible for persons concerned in the carriage of cargo to guard against damage by the inherent vice of that cargo, as this is a natural quality of the goods and is seldom discernible before shipment. We fear that in the past many claims have been settled for damage to cargo, which was really caused by its own inherent vice.

To illustrate this, as far as cargo is concerned, we might mention such things as the heating of new grain, or grain shipped in an unripe condition, fruit shipped in an under- or over-ripe condition, the bursting of bottles or casks of some liquids through fermentation, loss of weight by change of condition or character etc., etc.

Fruit is one of the articles most liable to be damaged by its own inherent vice, and sometimes a consignment that is very ripe is shipped that will become decomposed during the voyage and seriously damage other parcels of fruit.

When shipping new grain, especially new maize, it will sometimes be found that this is soft and has a feeling of dampness ; such maize will often heat and not only damage itself, but cause much damage to other cargo.

We must say it is most difficult to detect goods which are liable to cause damage by inherent vice, and still more difficult to guard against such damage. It is impossible to give any advice or recommendation as to how damage by inherent vice can be avoided at all times, but in receiving cargo, those concerned should be very careful to note any indications of conditions that may lead to damage from this cause during the voyage, and see that they protect themselves in the receipts given for such cargo.

(10) DAMAGE CAUSED BY CARGO SHIFTING

One does not hear so much about damage to cargo now by shifting as in former days. This we attribute to such causes as the alteration in the build of vessels, (thus minimising the rolling), the passing away of the sailing vessels, (which were frequently hove down for long periods by heavy pressure on their sails), the better packing of cargo, and the different containers used for cargo, and also that cargo is now carried in a much more mixed form, thus giving a greater opportunity to those concerned to stow it so that it will not shift. We still hear, however, on occasion of cases of damage arising through shifting cargo.

Such damage usually applies more to the ship itself, as, for example, stanchions being carried away, bulkheads burst, etc., but still there are many cases where the cargo itself will suffer.

Goods most liable to shift when carried in bulk are, grain, coal, shingle, flints, some ores, broken granite, etc., but although these are liable to shift they damage themselves very little, except perhaps in the case of breakage.

From the point of view that a shift of cargo may so list a vessel as to render her unseaworthy, such an occurrence must be guarded against, and the necessary precautions taken to erect shifting boards where necessary. It is essential, too, to see that the cargo is well "trimmed"—that is to say, whenever possible every space used is filled up solid.

Cargo, such as a barrel cargo or a general cargo of mixed goods, is very liable to be damaged by shifting. For instance, with a barrel cargo, if one barrel shifts and collapses, it may mean very heavy and serious damage to a large portion of the cargo.

We might mention the case of a vessel crossing the Atlantic with a part cargo of oil in barrels. In one hold the cargo shifted, with the result that the whole consignment collapsed and was broken up, and nothing was left in that hold on arrival but broken barrels with oil mixed. This shift of cargo was due to some of the casks in the lower tier breaking up through severe pounding of the vessel, and so loosening the whole stowage.

Again, a vessel loaded with a general cargo experienced severe weather in the Atlantic, causing the cargo to shift slightly. This started it working, with the result that the dunnage wood between the cargo became displaced, and consequently undue pressure was brought on many cases in the hold, with the result that several collapsed and much cargo was damaged.

Modern vessels frequently load and discharge at several ports, and a considerable amount of damage by shifting is caused, owing to the carelessness on the part of those concerned, in not seeing that their cargo is well blocked off, when changing ports; either loading or discharging. It often occurs that as a vessel finishes working at a late hour, cargo is left not blocked off, and lower deck hatches are not put on, with the result that should the vessel meet with bad weather between ports, much damage may be done. The excuse we have heard made on many occasions like this, is that either the crew have not had time to secure the cargo, or that it would necessitate detaining the ship and possibly paying stevedore's overtime. We cannot emphasise the fact too strongly that in our opinion it is far better to lose a little time, or go to a little expense to secure cargo between ports, than to run risks of very serious and heavy claims, which cannot always be attributed to bad weather.

(11) DAMAGE CAUSED BY PILFERAGE

We have no hesitation in saying that the damage caused to cargo by pilferage is the most serious liability falling on the shipowner at the present time, and no matter how careful one may be it seems that it is almost impossible to prevent it. We are of the opinion, that the great prevalence of this evil, is owing to the light sentences which have heretofore been given in many ports to persons caught pilfering ships' cargoes. We are pleased to note, however, that apparently owing to the serious notice taken lately of this matter, one or two of our magistrates have made it known that they intend to put this evil down; and we think very rightly so.

Damage by pilferage is not always serious as regards the amount of goods actually stolen, but the wilful damage often done to goods leads to serious claims. One frequently sees cases in a cargo smashed open evidently to find out what they contained, and perhaps serious damage done to the contents, that may be an antique piece of furniture, or a piece of delicate machinery, etc.; and we have known of cases where liquid containers have been opened, which have afterwards leaked and caused very serious damage.

Damage by pilferage occurs more especially in regard to foodstuffs and liquors, the packages of which are usually clearly marked, and of course the contents known. The same thing applies to wearing apparel; to see a case in a general cargo marked "Men's size, 6," etc., means that it is almost certain to be pillaged.

As we have said before, it is almost impossible to guard against this. The only way appears to be to carefully examine the cargo when received, and keep a careful and constant watch during the whole process of loading and discharging—not only until the particular article is stowed, but the whole time that the hold is open. It is a common thing when, for instance, a consignment of spirits is stowed in one part of the hold, and cargo possibly partly over-stowing it, for the spirit to be tampered with whilst cargo is being loaded in another part of the hold.

Valuable goods such as jewellery, etc., are of course very liable to pilferage, but this class of goods are usually carried in specially provided accommodation, such as "lock ups," store rooms, spare cabins, etc., which minimises the rick of pilferage. While we appreciate that this is a very serious source of damage to cargo, we also appreciate the fact that it is the most difficult problem with which the shipowner has to contend at the present time, and we still maintain that the solution of this problem lies entirely with our magistrates and their administration of the law, and not with the people actually concerned in carrying cargo.

(12) DAMAGE CAUSED BY FIRE

Fire is often the cause of damage to cargo, and no particular rule can be laid down for dealing with it, as it depends entirely on the condition of the fire, what kind of fire, and amongst what kind of cargo it is.

In all cases of fire one must deal with it cautiously and carefully, but quickly, after coming to a decision as to what steps to take. For instance, in certain cases it is no use rushing and opening hatches, etc., to put water down the hold—as by so doing you may start a huge conflagration which possibly might have been more easily smothered out. Fires in different cargoes need to be handled in different ways. With a fire in a coal cargo, surface ventilation and water should be applied at once; whereas should a fire occur in a general cargo it is far better, if possible, to first keep all the holds closed, and inject steam amongst the cargo, which will often have the effect of smothering the fire. Much more good can be done by taking precautionary methods to prevent fire than is possible when a fire actually occurs, and when stowing cargo of all kinds this fact should always be given the utmost consideration.

Some fires are caused by spontaneous combustion. Many cargoes, i.e., coal, oily cotton, dirty rags, some seeds such as linseed, and often sugar, will take fire in this way, unless well and properly stowed and ventilated. We have known an instance in a cargo of sugar, where no less than four distinct fires were discovered in one hold caused by spontaneous combustion, and which were smothered out.

In the case of a fire occurring on board, one should immediately endeavour to ascertain amongst what goods the fire has started. If amongst cargoes such as coal, or in the bunkers, hatches should be taken off and water applied as near as possible to the seat of the fire.

If, however, it is amongst such cargoes as cotton or jute, on no account should the hatches be opened, but all openings should be closed down as quickly as possible, and steam injected into the hold. Most modern vessels are now supplied with a system of piping led into the hold for this purpose. The usual method is to have a line of independent pipes jointed on to the steam supply piping for the winches, with a blank flange in between. All that is necessary then in a case of fire, is to break the joint of the steam pipe, withdraw the blank, and remake the joint.

If a ship is not so supplied it is often possible to break a joint of a steam pipe leading to one of the winches, and make a connection to the hold through one of the wooden hatch covers.

Failing this, it is sometimes possible to take out a valve of the suction pipes from the bilges, and make connection through the bilge pumps, but naturally all these expedients depend entirely on the vessel, and the facilities available on board for dealing with fire.

(13) DAMAGE CAUSED BY VERMIN

Damage by vermin is diminishing yearly, this being due no doubt to the change from wooden vessels to those of steel, also to the different conditions under which ships are kept, and the cleanliness that is now maintained.

Another factor is no doubt the stringent rules and regulations which apply to most ports, that have been enacted, since it was discovered that rats spread the much dreaded bubonic plague.

One seldom comes in contact with instances of cargo having been damaged by vermin in these days, except perhaps with meat, cheese or other foodstuffs; and then if the truth was known we think this is mostly done either before shipment, or after landing in a wharf or warehouse.

It is only necessary for us to say that every effort should be taken that can possibly be made to clear a vessel of vermin, which indeed is no more than one is practically forced to do in all cases.

All corners and places that would harbour vermin should be kept particularly clean, and should be disinfected at frequent intervals; no decayed food should be allowed to remain in the store rooms, etc., and if there is any suspicion of vermin being on board fumigation should be resorted to at frequent intervals.

(14) DAMAGE CAUSED BY BAD STOWAGE

Once a cargo is accepted for shipment, it is incumbent on all concerned that it should be stowed in such a manner that it can be carried and delivered without damage.

We are convinced that "bad stowage" is responsible for more damage to cargo than is generally realised, and we will go so far as to say that much damage which has been attributed to "perils of the sea" has been really caused or contributed to by "bad or incorrect stowage."

In other parts of this work we have given recommendations that should, if followed, lead to good stowage and consequently a good out-turn of cargo, and in Ch. I we have given the principles of stowage, so we will be content to give here a number of instances of how cargo has actually been damaged in this manner.

For example, if hardwood such as mahogany, etc., is stowed below such articles as barrels of grease, and leakage occurs and the wood becomes greasy, very serious damage may result. This may not be apparent or look serious so far as the timber is concerned, but the buyers will not accept it as it affects the glueing in making furniture, etc.

Again, speaking of timber, one often finds resin, fuller's earth, etc., stowed above prime lumber without any tarpaulins or separation between the lumber and these goods, the result being that some of the turpentine or fuller's earth or other gritty substance gets on to the wood, causing damage. This often leads to heavy claims, as it is alleged that it costs a considerable sum to have this wood planed owing to the damage the grit causes to the machines.

Congoleum and linoleum frequently produce heavy claims on account of damage to these goods by pressure. This results from having them stowed on sharp dunnage wood, or an uneven surface which dents the rolls and thus damages them—this being the result of bad stowage.

Cases of canned meats being stowed on top of new maize shipped in bulk has caused a serious loss. The maize heating had damaged the canned meats, and this was considered to be the result of bad stowage.

We could give a great many examples of damage that have come to our notice which have been caused by **"bad stowage"** but it would be useless for us to do so. We must ask our readers to use their own judgment in this matter, and coupled with the advice we have given in various parts of this work in connection with the many articles mentioned, which we hope may be helpful, that damage by bad stowage will be minimised.

(15) DAMAGE CAUSED DURING DISCHARGE

Cargo is very often damaged during the operation of discharging a vessel—in fact we venture to say that much cargo which is returned as "found broken in stowage" is actually damaged whilst being discharged; either through carelessness, accident, or undue haste. Although it may be said that the stevedores do this, and are consequently liable, as the merchant has shipped his goods with the shipping company in good order and condition, it remains the liability of the shipowner to deliver the goods in like good order and condition; and although the stevedore, being the servant of the shipowner, is responsible to him the shipowner himself is responsible to the merchant until the goods are delivered.

A great many examples might be given of damage caused during discharge; such as heavy cases slung with a single chain, or a chain sling which cuts right into the case and often damages the contents; or heavy sets of mahogany or other prime hardwood hoisted from the hold with a chain sling, which in many cases cuts the edge of the boards and causes damage.

Damage to bag cargo is often caused through "dragging out" over a rough surface of cargo, or the hatch coamings, or by contact with pillars, stanchions, etc.

Damage by hooks is also very frequent and sometimes results in very serious claims, and it is absolutely necessary to insist that no hooks be used on any cargo of such a nature that would be damaged in this way. In the case of such cargo as Timothy Seed, one small hook hole will practically empty the bag.

It often occurs that rolls of paper, cloth or other such goods are damaged by hook holes, and although the hole may be hardly perceptible on the outside, it may have affected the contents to a large extent.

Damage is often caused to a cargo by other portions of cargo of a dusty nature, such as cement, slag, fuller's earth, etc., which gives off a heavy dust while being worked. It often happens that consignments of cargo in the hold are badly covered with dust and sometimes damaged, whilst other portions of cargo are being discharged, and it is always advisable in cases like this to see that cargo is well covered with old tarpaulins, separation cloths, etc.

When discharging a bag cargo a needleman should always be kept in the hold. It is not sufficient to sew up a bag after it has been landed or put in the barge, but it is much better, on the slightest hole being discovered, to have it sewn up at once, as this will often obviate serious loss of contents.

Also cargo is often damaged in discharge by not keeping the holds clear of loose cargo, as if loose is allowed to collect in the holds, and perhaps a few damaged bags or perhaps a small damaged portion of cargo gets mixed with this, it is liable to ruin the lot. When discharging a bag cargo always have all the loose sweepings taken up before breaking the lower or ground tier.

If a clean receipt or Bill of Lading has been granted for goods received, should they be in a bad order when delivered, the onus will be on the owners and master to prove that the damage did not occur through any fault of the ship or ship's servants, or that the damage is provided for by one of the exception clauses in the Bill of Lading. It is at all times, however, a wise precaution to call in a surveyor and consult with him before delivering or discharging damaged goods.

CHAPTER VI

MISCELLANEOUS

In this chapter have been grouped together explanations and notes upon a few items it is considered desirable to mention, as they have a direct bearing on the stowage or carriage of cargo.

The following subjects are treated :

- Baggage
- Ballast
- Cargo Plans
- Cubic Measurement
- Fresh Water
- Receipts
- Ventilation

BAGGAGE

Under this heading should be included all personal effects, luggage, and unaccompanied baggage, which is the property of any one proceeding in the vessel as a passenger.

The carriage of baggage must of necessity be governed by the various rules and conditions issued by the company with which the passenger is travelling, as each company has its own special regulations. It is usual to depute a junior officer to act as Baggage Officer, and he should receive the baggage and pay even more attention to its " stowage " than to ordinary cargo.

Most companies issue specially printed labels with marking for identification, for the different classes, and also whether required for " cabin use," " wanted on voyage," or " not wanted." These labels should always be used, as it facilitates the work of the persons in charge in sorting, and also in identifying the packages when required.

The baggage marked " Not wanted on voyage " should of course be stowed below as convenient. Most passenger vessels have a baggage room to which passengers are allowed access at stated periods, and it is here that baggage is frequently damaged owing to constant handling, and also to the impossibility of making " solid " stowage.

Care must be taken that no heavy packages are placed on top of lighter ones, and also that baggage is stowed in such a manner as to prevent damage by chafage, damp, heat, or vermin.

BALLAST

A vessel proceeding on a voyage without cargo, would in most cases have insufficient stability, or her propeller would not be immersed deeply enough to get efficient results from the engines. To remedy these defects, some heavy commodity is carried to take the place of her cargo, and anything used for such purpose is termed " ballast."

In the past such articles as clay, earth, gravel, sand, stone, rubbish, etc., were usually employed, and the amount required, and its disposition, had to be governed by the class of vessel, intended voyage, and other circumstances.

Nowadays vessels are all more or less ballasted with water in double bottoms, peaks, and/or deep tanks ; but there are still occasions when other ballast is required. A vessel may not have sufficient permanent water ballast tanks, or the disposition of her tanks may not be satisfactory. It is here, or in the case of small vessels not fitted with tanks, that the above commodities are still used, and no comment need be made upon the stowage, except that shifting must be guarded against, and if dry sand is used care should be taken that it is not allowed to run into the limbers and choke the pumps.

The usual method of employing water as ballast is to have a double bottom divided into tanks. The peaks, too, are made into tanks ; and modern vessels are now practically all fitted with what is termed a " deep tank," that is, one hold is fitted with a strengthened bulkhead at both ends, brought right up to the main deck, with square openings for hatches, and this compartment can be used for water ballast or cargo as may be required.

When the idea of these deep tanks was first put into practice it was customary to place them abaft the engine-room, but it has been proved by experience that this is not the most suitable position. The present method in most cargo steamers is to make use of the hold forward of the engine-room, in the position of what was originally termed the " cross bunker." This hold is made into a deep tank with watertight doors into the stoke hold, so that it can be used either for ballast, bunkers or cargo.

There is a great divergence of opinion as to the best method of trimming the ordinary flat bottomed cargo steamer when in ballast. It has been a common practice to fill all the after water ballast tanks, and immerse the propeller as much as possible to avoid the engines racing. In fact, some shipmasters have even advocated, and practised, leaving the most forward ballast tank empty. This, we consider, a bad practice and one that has been the cause of many vessels receiving damage to their bottom by what is termed " pounding." Further, in this condition it is not possible to obtain the best results from a vessel's engines, or to handle her efficiently (except in smooth water), as when on a more even keel.

In our opinion the best possible method of ballasting this type of vessel is to immerse her bodily as much as possible, and then trim her slightly by the stern with the after peak tank.

CARGO PLANS

For the efficient discharging of a cargo it is imperative that proper stowage plans should be prepared, as without these, showing the various items of cargo, and their disposition in the vessel, it is impossible to make the necessary arrangements in advance for the expeditious discharge and disposal of the cargo.

It is important that those responsible for the stowage should prepare a correct cargo plan immediately after the loading is completed. Many vessels are now engaged in trades where cargo is loaded in various ports to be discharged in several ports, and consequently the keeping of an accurate plan is of the highest importance.

If the quantities and description of the cargo are put correctly on the plan, a very accurate estimate of the amount of time it will take to discharge the vessel in each port can be made. The plan should be sent ahead of the ship, if possible, in order that the people concerned may have an opportunity of making the necessary arrangements for discharge immediately the vessel arrives.

A correct plan received in good time is valuable, whereas an incorrect plan is often worse than no plan at all. For example consider a vessel discharging a general cargo in the Port of London. If a correct plan is at hand before the vessel arrives, craft can be ordered to take cargo direct ex ship as it rises, and so save the great expense of landing. If, on the other hand, no plan is available, often heavy expenses are incurred, either through loss of time to the vessel, demurrage on craft, or landing cargo which should have been delivered direct overside. Hence it will be seen that a correct stowage plan is almost indispensable.

A correct cargo plan will give information also respecting the disposal of weight throughout the vessel—a matter of great moment from the point of view of the vessel's stability. Having discharged part cargo, the plan will show the extent and manner of the readjustment of weight to be made, to preserve a required stability or trim.

In this respect a complete and correct cargo plan is essential, even when the vessel is completely discharging at a single port.

CUBIC MEASUREMENT

Cargo not carried on a deadweight basis is taken on what is termed cubic measurement, which is usually calculated at 40 cubic feet to the ton.

The cubic measurement of a particular package or of the available space in a ship's hold is obtained in the following manner :—

Reduce all measurements to the same denomination, e.g., feet :

Length × Breadth × Height = Cubic Units in package.

Example (1).—5 × 4 × 2 ft. = 40 cubic feet.

Example (2).—

$$\text{Beam} = 20\text{ ft} \times 15\text{ ins.} \times 6\text{ ins.}$$

$$= \frac{240 \times 15 \times 6\text{ ins.}}{1728} = 12.5\text{ cubic feet.}$$

[N.B.—1728 inches = 1 cubic foot.]

FRESH WATER

This is usually carried in permanent iron tanks fitted in the vessel, and should be cleaned out and whitewashed at fairly frequent intervals.

When taking fresh water on board for domestic purposes, care should be exercised to see that it is tested, and that the purity of the water is beyond question, for otherwise the whole of the supply on board may be ruined. It frequently occurs that the fresh water tanks are fitted in the holds in which cargo has to be stowed, and in this case great care is necessary in filling these tanks, and in seeing that any lead pipes are protected, as in many cases these pipes have been damaged by vermin, or other means, and water has leaked into the holds and damaged cargo. When working cargo in such holds, every precaution must be taken to prevent the lead pipes communicating with the fresh water tanks from being damaged. Lead pipes being soft are easily bent or punctured.

RECEIPTS

It is very important to see that all receipts for cargo, both given and received, are accurate in every detail, both in respect of quantity, and in regard to the condition of the cargo to which they refer. On cargo being received on board or into shed or warehouse for shipment, a receipt is given which is called the "Mate's Receipt," and it is on the production of this receipt that the master or agent signs the Bill of Lading. The Master of every vessel is personally responsible if he signs a Bill of Lading (the most important document there is in connection with the cargo) if it is not truly in accordance with the Mate's Receipt.

Cases very often occur where Masters or Officers are asked to furnish a clean receipt, and are presented with a letter of idemnity covering some fault, or shortage, in the quality or quantity of the cargo. On no account should this be accepted, as it leaves an opening to illegal practice for which the Master will be held responsible.

Care should be taken to qualify the receipt in such a manner as to cover anything that the recipient is not absolutely certain of; such as, "condition of contents unknown" for closed packages, "weight unknown" for articles that have not been weighed etc., etc.

On the other hand; when delivering cargo after the production of the Bill of Lading (or delivery order), every precaution should be taken to see that the receipt obtained accurately describes the quality and condition of the cargo as delivered. It is not sufficient to generalise and say "A few boxes broken" or "A few bags torn and slack," as it often occurs that cargo for which such receipts have been taken, are more extensively damaged between the time they leave the vessel, and the time when they are actually in the receiver's hands, and heavy claims are often made on the ship for damage done between the ship and receiver's premises.

In event of it being impossible to obtain a receipt for cargo in agreement with the actual condition, delivery should be withheld until the consignment has been examined by a competent surveyor.

VENTILATION

Ventilation is a factor which has great effect on the efficient carriage and stowage of a vast majority of cargoes. It would be impossible here to describe every means and method adopted for all cargoes. The people in charge of the loading and carriage of goods, must treat each case or each cargo separately, according to its special requirements.

Some cargoes require surface ventilation, others internal ventilation, and some require no ventilation at all, and throughout this work wherever it has been considered advisable the matter has been mentioned. It must be clearly understood, however, that while certain suggestions have been made as the results of practical experience, it is felt to a great extent that the question of ventilation must be left to those concerned to use their own discretion, and to be guided by prevailing circumstances.

CHAPTER VII

WEIGHTS AND MEASURES USED IN SHIPPING

ALTHOUGH the British weights and measures and those of the Metric system are principally in use throughout the world, there are still many countries who retain their own units and use them in shipping.

Ignorance of these local customs, especially in the use of the word "ton," has often been the cause of trouble, and it is therefore proposed in this chapter to enumerate the more important weights and measures required for the purpose of stowage in use throughout the world.

For the purpose of ready reference the subjects of this chapter have been grouped in the following order:—

1. British units.
2. Metric Units.
3. The Units of various Countries.
4. Timber Measurements.
5. Beer, Wine and Spirit Measure.
6. Grain Measures.

BRITISH UNITS

Avoirdupois Weight

16 drams = 1 ounce (oz.)
16 ounces = 1 pound (lb.)
14 pounds = 1 stone (st.)
28 lb. = 1 quarter (qr.).
4 quarters (112 lb.) = 1 hundredweight (cwt.)
20 hundredweight (2240 lb.) = 1 ton.

Note.—1 cental (or quintal) = 100 lb.
1 short ton = 2000 lb.
1 stone (Butcher's) = 8 lb.

Capacity

4 gills = 1 pint.
2 pints = 1 quart.
4 quarts = 1 gallon.
2 gallons = 1 peck.
4 pecks = 1 bushel.
8 bushels = 1 quarter.

Note.—Liquids are measured by this table up to gallons. The remainder of the table is used for measuring dry goods such as grain, etc.

1 gallon of Pure Water weighs 10 lb.
This equivalent enables one to obtain the approximate weight of a liquid, e.g. water in a tank.

6¼ gallons = 1 cubic foot.
224 gallons of Water weigh 1 ton.
10 English gallons = 12 American gallons

Cubical Content

1728 cubic inches = 1 cubic foot.
27 cubic feet = 1 cubic yard.

Note.—1 cubic foot weighs 1000 oz. or 62½ lbs.

1 shipping ton Merchandise = 40 cubic feet.
1 shipping ton Timber = 42 cubic feet
1 ton register = 100 cubic feet.
1 ton displacement = 35 cubic feet.
A Builder's cartload is 1 cubic yard
(e.g.) a load of gravel.

The following commodities have measures peculiar to themselves:

COAL AND COKE

1 sack = 224 lb. or 2 cwt.
10 sacks = 1 ton.
1 barge or keel = 21 tons 4 cwt.
20 keels = 1 ship load.
1 room = 7 tons.
1 chaldron of Coke = 12 sacks.
1 chaldron = 25½ cwt.

HAY AND STRAW

1 truss of Straw = 36 lb.
1 truss of Hay = 56 lb.
1 truss of New Hay = 60 lb.
36 trusses of Hay = 1 load.

FISH

4 fish = 1 warp.
33 warps = 1 long hundred (132).
10 long hundreds = 1 " thousand " (1320)
10 thousand = 1 last (13,200).

Note—1 barrel Anchovies = 30 lb.
1 box of Fish = 90 lbs.
1 cran of Herrings = 37½ gallons.
1 barrel of Herrings = 26⅔ gallons.
1 maze of Herrings (Ireland) = 5 long hundreds of 123 each.

EGGS

Eggs are often sold by the Great Hundred.

20 eggs = 1 score.
5 score (1 quintal) = 1 common hundred.
6 score = 1 great hundred.
1 great gross = 144 dozen.

BRICKWORK

1 rod of Brickwork = 306 cubic feet.
Ordinary Bricks average 7 lb. each.
1 load of Bricks = 500 (= upwards 1½ ton).

GLASS

1 stone = 5 lb.
24 stone = 1 seam.

METRIC UNITS

The Metric System of weights and measures is in use in many parts of the world, and though legalised in the United Kingdom has not so far been adopted for general purposes.

The great feature of the units in use is that the unit of capacity, the unit of weight, and the unit of mass are directly obtained from the unit of length, and hence conversion from one system to another is little more than altering the name. The system is a decimal one, and corresponding fractions of a unit or corresponding multiples are denoted by the same prefix—e.g. 1-10th Metre is a Decimetre ; 1-10th Gram is a Decigram ; 1000 Metres is a Kilometre, 1000 Grams is a Kilogram.

Weight

The unit of weight—the Gram—is the weight of 1 cubic centimetre of pure water.

1 Gram = 10 Decigrams = 100 Centigrams = 1000 Milligram.

1 Kilogram = 10 Hectograms = 100 Decagrams = 1000 Grams.

Note—The Kilogram is the commercial unit.

1 kilogram = 1 litre of Water.
1000 kilograms = 1 metric tonne (2204.6 lb. av.).
100 ,, = 1 quintal.
1 kilogram = 2.2 lb avoirdupois.

Capacity

The unit is the Litre, which is 1 cubic decimetre and therefore occupies 1000 cubic centimetres.

The table is exactly the same as that for weight by the mere substitution of Litre for Gram.

Note.—1 Litre = $1\frac{3}{4}$ pint (approx.).

This table is the one usually in use for capacity except in the case of solid content.

Cubical Content

The unit is the Stere, which is equal to 1 cubic metre, that is 1000 cubic decimetres or 1 kilolitre.

This unit is used especially with reference to timber.

THE UNITS OF VARIOUS COUNTRIES

Abyssinia. These differ in various localities.

Africa (British). Same as U.K. ; but in S. Africa 1 short ton =2,000 lb.

Algeria. Metric System.

Argentine. Metric System.

Australia. Same as in the United Kingdom, except that in New South Wales a ton of flour or other milled product weighs 2000 lb.

Austria. Metric System.

Azores. Metric System. Some Portuguese measures still in force.

Belgian Congo. Metric System.

Belgium. Metric System.

Bolivia. The Metric System is in force, but old Spanish measures are still used (q.v.).

Brazil. The Metric System is the legal system, but some old Portuguese measurements are still in vogue (q.v.).

British Guiana. Same as in the U.K.

British Honduras. Same as in the U.K.

British North Borneo. Same as in the Straits Settlement.

Bulgaria. Metric System.

Burma. As India (q.v.).

Canada. Same as in the U.K. In addition

1 cental=100 lb.
1 short ton=2000 lb.

Canary Island. Same as in Spain.

Ceylon. Same as in India.

Chile. The Metric System is in general use. Some old Spanish measures are still used (q.v.).

1 arroba (Wine)=3.55 gallons.

China. In treaty ports and Hong Kong the U.K. weights and measures and the Metric System are used generally.

CHINESE WEIGHT

Tael=1.33 oz.
Catty (16 taels)=1.33 lb.
Picul (or tan)=133.33 lb.
1 lb.=12 taels (¾ catty).
1 cwt.=84 catties.
1 ton=16 piculas, 800 catties or 1680 catties.

Colombia. Metric System is legal. Still, occasionally, old Spanish measures are used (q.v.).

Costa Rica. The Metric System is legal, other old Spanish measures are still in force (q.v.).

Crete. Metric System is in force.

Oke=2.82 lb.

Cuba. The Metric System is the legal system. Some American measures are in use.

Cyprus.

WEIGHT

400 drams = 1 oke.
1.8 okes = 1 litre (Cyprus).
44 okes = 1 kantar.
800 okes = 1 ton.

LIQUID

1 kouza = 9 quarts.
16 ,, = 1 load.

CAPACITY

2 pints = 1 quart.
4 quarts = 1 gallon.
8 gallons = 1 kilé.

Czecho-Slovakia. The Metric System is in general use.

Denmark. The Metric System is legal.

Dominican Republic. The Metric System is legal.

Dutch East Indies (Java). Locally the
Catty (16 tael) = 1.356 lb. (av.).
Picul = 100 catties.
Commercial pound = 1.082 lb. (av.).
1 large Bahar = 1831.021 (av.).
1 kan = .328 gallons.
1 Leager = 127.337 gallons.

Dutch Guiana. Metric System. Also :

1 kan = .328 gallon.
1 leager = 127.337 gallons.

Dutch West Indies. Metric System.

Ecuador. Metric System legal, but old Spanish weights and measures occasionally used (q.v.).

Egypt. The Metric System is generally used.

EGYPTIAN WEIGHTS AND MEASURES STILL USED.

1 rottolo = 0.99 lb. (av.).
1 oka = 2.75 lb. (av.).
1 Trade oka = 2.86 lb. (av.).
1 kantar = 100 rottolo.
1 ardeb (Cairo) = 4.92 bushels.
1 ,, ,, = 307 lb. (Wheat and Maize).
1 ,, ,, = 267 lb. (Cottonseed).
1 ,, ,, = 323 lb. (Beans).
1 ,, ,, = 88 okas (Barley).

Federated Malay States. 1 picul = $133\frac{1}{3}$ lb.

Finland. Metric System.

France and all French Colonies. Metric System, and locally:

I barrique (Bordeaux) = 401.28 pints
I barrique (Marseilles) = 394.24 pints.
I millerolle = 112.64 pints.
I piecé (Bordeaux) = 668.8 pints.
I pipe = 1091.2 pints.
I tonneau (Metric tonne) = 2204.6 lb. (av.).

Germany. Metric units with German names.

Greece. Metric System is in use for trade purposes

Note.—The Metric Units are given Greek names.

Local measures in use:

The oka = 2.822 lb..
791 okas = I ton.
Baril (Wine) = 16.33 Imperial Gallons.
Kilé = 1.07 bushels.
Venetian pound = 1.05 lb.

Guatemala. Metric System.

Haiti. The Metric System and the U.K. measures are used.

The pound of 500 grams, the demikilo (1.102 lb.), is adopted by the Customs.

The short ton = 2,000 lb.
I quintal = 100 lb.

Holland. Metric System with local names.

Honduras. Metric System, but old Spanish weights still in use (q.v.).

Hungary. Metric System.

Iceland. Same as Denmark.

India. Under the Indian Weights and Measures Act, 1870, the standard of weight is the Ser (= the kilogram), and the standard of capacity is also called the Ser (= the litre).

In general the U.K. weights and measures are in use.

Locally the following are in force:

PRINCIPAL INDIAN WEIGHTS AND MEASURES.

Tola = 180 grains (troy).
Ser (Standard or Railway or Indian) = 2.057 lb.
Ser (Factory) = I lb. 13.5 oz.
Viss = 3.6 lb.
Maund (Standard or 40 sers Railway or Indian) = 82.286 lb.
Maund (Factory) = 74 lb. 10 oz. 11 dr.

LOCAL WEIGHTS AND MEASURES USED IN THE EXPORT TRADE.

	British Value.	Commodities
BOMBAY		
Ser	$11\frac{1}{5}$ oz.	
Maund (40 sers)	28 lb.	
,, (Surti) ..	39.2 lb. (also 29.4, 38.26, and 41.06)	Cardamons
Candy		
11 Bombay maunds	308 lb.	Coriander seed
20 ,,	560 ,,	Castorseed, Ground Nuts, Sesame, Tobacco
21 ,,	588 ,,	Chillies, Pepper, Turmeric, Raw Wool
22½ ,,	630 ,,	Mustard seed
25 ,,	700 ,,	Myrobalans
27 ,,	756 ,,	Barley, Bajra, Grain, Wheat, etc.
28 ,,	784 ,,	Cotton, Cottonseed, Pulse, etc.
29½ ,,	823 ,,	Nux Vomica
CALCUTTA		
Ser (80 tolas)	2.05 lb.	
Maund (Bazaar)	82 lb. 2oz. 2dr.	
COCANADA		
Maund	25 lb.	Turmeric
Candy	500 lb.	Raw Cotton
CUDDALORE		
Candy (French)	530 lb.	Groundnut
KARACHI		
Ser (80 tolas)	2.05 lb.	
Candy (8 maunds of 82 lb. each)		Barley, Rice, Sesame, Wheat
Maund	28 lb.	Raw Hides
	$82\frac{2}{7}$ lb.	Oilseeds
	84 lb.	Wool
	86.4 lb.	Bone Manures
MADRAS		
Maund	25 lb.	Indigo
Candy	500 lb.	Raw Cotton
Candy (Dutch) ..	672 lb.	Copra
NEGAPATAM		
Ser (24½ tolas)	$9\frac{3}{5}$ oz.	Chillies and Ginger

	British Value.	Commodities.
TUTICORIN		
Candy	500 lb.	Raw Cotton
Maund	26 lb.	Coffee
Tulam	14 lb.	Groundnut cake
	15 lb.	Chillies
	20½ lb.	Sugar

Italian Africa. Metric System.

Italy. Metric System. The names are altered; however, the metre being the metro, etc.

Japan—

Kin (catty) = 1.325 lb
Picul (100 kin) = 133.3 lb.
Koku, dry = 4.963 bushels.
Koku, liquid = 39.7 gallons.
1 To = 3.97 gallons.

Java. See Dutch E. Indies.

Jugo Slavia. Metric System.

Liberia. Same as the U.K.

Madagascar. Metric System

Malta—

1 barrile (Wine) = 9.35 gallons.
1 rotolo = 1.745 lb.
1 maltese pint = 0.833 pint.
1 salma = 7.94 bushels.

Manila. 1 picul = 140 lb.

Mauritius and Seychelles. Metric System.

Mexico. The Metric System is the legal system, but old Spanish measures are used sometimes (q.v.).

Morocco. There is no standard system, but at the ports both the U.K. and the Metric measures are in use.

1 kintar (Custom House) = 112 lb.
1 kintar = 168 lb.

Netherlands. Metric System. Local names for the Metric units: Kan = Litre. Pond = kilogram.

Newfoundland. Same as the U.K.

New Zealand. Same as the U.K. All frozen meat shipments are reduced to a standard called a "freight carcase." 1 freight carcase = 60 lb. = 3 cubic feet.

Nicaragua. Metric System.

Norway. Metric System.

Panama. Both the Metric System and American weights and measures are in use.

1000 kilos = 1 Metric ton = 2204.6 lb.

Paraguay. Metric System is legal system.

Persia. The weight unit is the miskal=71 gr.

1 ratel=1.014 lb. (av.).
1 batman (or maund)=6.5 lb.
1 karwar=6.49 lb. (av.).
1 batman rei=27 lb. (av.).

Peru. Metric System. Old Spanish (q.v.). British also in use.

Fenega (Wheat)=135 or 140 libra.
Canga=150 libra.
1 libra=1.0143 lb.

Philippine Islands. Metric System

1 picul=139.482 lb. (av.).
1 arroba=25.36 lb. (av.).
1 catty=1.394 lb. (av.).

Poland. Metric System.

Porto Rico. Metric System, but the U.S.A. measures are in use.

Portugal. The Metric System is the legal system, but old Portuguese measures are still used in some countries formerly under Portuguese control.

OLD PORTUGUESE MEASURE

The Arratel=1.012 lb. (av.).
The Arroba=32.38 lb. (av.).
The Quintal=100 arratel.

Portuguese E. Africa. Metric System and U.K. weights and measures.

Portuguese W. Africa. Metric System and U.K. weights and measures.

Rumania. Metric System. Some Turkish weights and measures still in use (q.v.).

Russia. A large amount of freight from the Baltic is quoted per ton of 62 poods.

1 funt=14.4 oz. (.9028 lb.)=1 Russian pound.
1 pood (40 funts)=36.113 lb.
100 poods=1.6121 tons.
1 vedro=2.71 gallons.
1 chetwert=5.775 bushels (46.2 galls.).

In the Black Sea the ton of 1990 lb. (av.) is often used.

Salvador. Metric System.

Samoa. Metric System.

Santo Domingo. Metric System.

Siam. The Metric System is being introduced.

1 chang (or catty) =2.675 lb. (av.).
50 chang (1 picul) =1 hap=133.75 lb. (av.).
1 keean (20 piculs)=2666 lb. (av.).

Siberia. Same as Russia.

Spain. Metric System is compulsory. In many countries that were colonised by Spain, old Spanish measures are still in use.

Last of Salt=2125 kilos.

OLD SPANISH MEASURE

The Arroba=25.36 lb. (av.).
The Galon=0.74 Imperial gallon.
The Libra=1.0127 lb. (av.).
The Quintal=100 libra.
The Tonelada=20 quintal.

Straits Settlement. The measures same as the U.K., also :

15 tahil=1 kati=1.33 lb.
100 kati=1 picul=133.3 lb.
40 picul=1 koyan=5333.3 lb.

Sumatra. Same as Dutch East Indies.

Sweden. Metric System.

Tripoli. Same as in Turkey, but the Metric System is in use.

Tunis. Metric System.

Turkey. Metric System is in use generally, but other weights are :

1 kele (or oke) =0.36 Imperial quarters.
100 kilees (Grain) =12.128 imperial quarters.
1 oke=2.828 lbs
44 okes=124.3616 lb.
39.626 okes=1 cwt.

U.S.A. The Metric System and U.K. Measures are mostly used. The old Winchester measures are also in use.

WINCHESTER MEASURE

1 pint (dry)=.9694 pint (Imperial).
1 gallon (dry)=.9694 gallon (Imperial).
1 bushel (dry)=.9694 bushel (Imperial).
1 quarter (dry)=.9694 quarter (Imperial).
1 pint (wine)=.8331 pint (Imperial).
1 gallon (wine)=.8331 gallon (Imperial).
1 pint (beer)=1.017 pint (Imperial).

1 quintal (cental)=100 lb. (av.).
1 short ton=2000 lb. (av.).
1 barrel flour=196 lb.
1 barrel beef=200 lb.

Uruguay. Metric System.

Venezuela. Metric System, but old Spanish Measures still in use (q.v.).

West Indies (British). Same as in the U.K.

Zanzibar. Same as the U.K.

The Farsalah, the unit of weight in the clove trade=35 lb.

TIMBER MEASUREMENTS

Timber cargoes are measured, at least so far as Great Britain is concerned, by the "Petrograd Standard." To those concerned in the great lumbering industry of America this system of measurement is certainly inconvenient, especially as the Metric units are in use. It is, therefore, of considerable importance to know the particular method of measuring timber, adopted in the different localities where the lumbering industry is carried on.

The following measures are universal.

Note.—A superficial foot means an area of 1 square foot of plank 1 inch thick. This is called a "Board foot" in America. Hence 12 superficial or 12 board feet make 1 cubic foot of timber.

100 superficial feet of Planking = 1 square.
120 Deals = 1 hundred.
108 cubic feet (12′×3′×3′) = 1 stack (½ a fathom).
216 ,, (6′×6′×6′) = 1 fathom. Estimated weight = dry, 2¾ tons; wet, 3–3½ tons.
128 ,, (8′×4′×4′) = 1 cord.
50 ,, of Squared Timber = 1 load.
40 ,, Unhewn Timber = 1 load (or 30 cwt).

Fir Timber (boards, etc.) is carried at 50 cubic feet to the ton (i.e. Pine, Maple, Baltic, Danzig, Riga, Memel Fir, Pitchpine, Spruce, Whitewood, Redwood, Elm, Walnut).

Hardwood (round timber) is carried at 40 cubic feet to the ton (i.e. Beech, Greenheart, Hickory, Teak, Mahogany, Ash, Elm, Oak, Birch).

The following names are in use but vary in different localities. Usually however:

Pieces of timber up to 7″ broad are known as "Battens."
Pieces of timber 8″—11″ broad are known as "Deals" (2″ and up thick).
Pieces of timber of 11″ (and up) are known as "Planks" (2″ thick and over).
A "Board" implies a thickness of less than 2″.
A "Scantling" is a piece of timber up to 6″ wide, and 2″ thick.

600 square feet 1 in. Boards = 1 load of 50 cubic feet.
400 ,, 1½ ,, ,, = 1 ,,
300 ,, 2 ,, ,, = 1 ,,
200 ,, 3 ,, Deals = 1 ,,
150 ,, 4 ,, ,, = 1 ,,
218 running feet 3×11 Planks = 1 ,,
267 ,, 3×9 Deals = 1 ,,
343 ,, 3×7 Battens = 1 ,,

1 Petrograd standard deal is 1 piece (3″×11″×6 feet) and 120 pieces of this deal make 1 Standard.

1 Petrograd Standard (120 pieces of 12 feet × 11″ × 1½″) = 165 cubic feet or 1980 superficial feet, commonly called "a standard."

Deals, battens, boards, and scantlings pay freight per Petrograd standard hundred, which equals approximately 3 tons in weight and stows in about 240/265 cubic feet. It is often paid also at the rate of 3 loads to a Petrograd standard.

100 Petrograd standard deals = 60 Quebec deals.

The above standard is the usual unit used in the timber trade by British merchants. The following standards have local significance.

1 London standard = 120 pieces of (12 feet × 3″ × 9″ Deals) = 270 cubic feet or 3240 superficial feet.

1 Irish standard ditto.
1 Gothenburg standard = 180 cubic feet.
1 Gothenburg standard (Poles) = 150 cubic feet.
1 Drammen standard = 120 pieces of (9 feet × 2½″ × 6½″) = 121⅞ cu. ft. or 1462½ sup. ft. (About ¾ of a Petrograd Standard).
1 Quebec standard hundred = 100 pieces of (12 feet × 11″ × 2½″) = 229⅙ cu. ft. = 2750 sup. ft.; and also 1000 running feet of 3″ × 11″.
1 Christiania standard hundred = 120 pieces of (11 feet × 1¼″ × 9″) = 103⅛ cu. ft. or 1237½ sup. ft. (About ⅝ of a Petrograd Standard).
1 Swedish standard deal = 14 feet of 3″ × 10″.
1 Norwegian standard deal = 12 feet of 3″ × 9″.
1 Batten Standard = 120 pieces of (12 feet × 2½″ × 6½″)—containing 146.2 running feet to the Petrograd standard.

The Wyburg standard, Sawn Deals = 2160 super feet.
Round Timber = 1560 ,,
Square Timber = 1963⅔ ,,

The Drontheim standard varies for different kinds of timber. It contains:

Sawn Deals = 2376 super feet
Round Timber = 1728 ,,
Square Timber = 2160 ,,

Danube 1 wagon load = 22 cubic metres = (770-780 cu. ft.), with approximate weight 10 tons.

1 rully = 12 feet × 6 feet × 3 feet = 1 fathom (216 cu.ft.). Estimated weight = 3¼ tons.

1 tult = 12 beams of baulks each 18 feet long (216 running feet of timber) with a top measurement of 11″.

1 Riga last contains 960 super feet of sawn deals or squared timber.

Lathwood. Generally stacked in fathoms of 216 cubic feet (2592 sup. ft.), or otherwise in piles measuring 6′ × 6′ × 8′ = 288 cubic feet. 1 bundle of Plaster Laths = 360 running feet.

AMERICAN LUMBER MEASUREMENTS

In consequence of the use of the Metric System in America so far as the lumber industry is concerned, the unit adopted is the Board foot (1′ × 1′ × 1″=144 cu. in.).

1 mille=1000 board feet ($83\frac{1}{3}$ cubic feet), or about $\frac{1}{2}$ of a Petrograd standard.

Another unit is the Stere (1 cubic metre)=35.314 cubic feet

Laths—W.C.S. America standard $\frac{1}{3}'' \times 1\frac{1}{2}'' \times 4'$; tied in bundles of 100 pieces.

$$\text{Australia Standard } \left.\begin{array}{l} \frac{1}{3}'' \times 1'' \times 4\frac{1}{2}' \\ \frac{1}{3}'' \times 1\frac{1}{4}'' \times 4\frac{1}{2}' \\ \frac{1}{2}'' \times 1\frac{1}{2}'' \times 4\frac{1}{2}' \end{array}\right\} \text{ Tied in bundles of 90 pieces.}$$

Douglas Fir (Green).—Special weights and measures relative to this timber which is largely shipped may be found useful.

1000 board feet weigh $1\frac{1}{2}$ ton (av.)

A stere contains 423.77 board feet and weighs about 13 cwt. (av.).

3.624 steres=1 cord (128 cu. ft.).

Shingles.—For freight purposes 10,000 shingles=1000 board feet, which may be stowed in 100 cu. ft.

Logs.—Logs, in consequence of their shape, occupy greater space than an equal volume of square timber, and hence the freight for logs is increased accordingly.

The actual contents of logs in board feet is computed according to the Brereton solid log table. Freight, however, is calculated by what is called the Square of the Mean Diameter Rule, and this is determined by adding 27% to the actual contents in the Brereton Table.

Freight on logs should be paid on actual contents (as is the case with rough timber) and not on a fictitious stowage figure as stated above. Freight is based on the assumption that 1000 board feet of logs (Brereton Scale) stows in 160 cubic feet bale space in a modern steamer, while 1000 board feet of lumber stows in 120 cu. ft. Hence the rate of freight on logs is $\frac{1}{3}$ higher than that for lumber.

BEER, WINE AND SPIRIT MEASURES

ALE AND BEER MEASURE:

2 pints = 1 quart (or pot)
4 quarts = 1 gallon
9 gallons = 1 firkin
18 ,, = 1 kilderkin
36 ,, = 1 barrel
54 ,, = 1 hogshead
72 ,, = 1 puncheon
108 ,, = 1 butt

WINE MEASURE

4 gills = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon
10 gallons = 1 anker (Brandy).
18 ,, = 1 runlet
42 ,, = 1 tierce
63 ,, = 1 hogshead
84 ,, = 1 puncheon
126 ,, = 1 pipe or butt
252 ,, = 1 tun

Note.—The gallons mentioned in this measure are the old Winchester wine gallons, one of which equals 0.8331 Imperial gallon.

A pipe of wine is a varying quantity according to the kind of wine which it contains.

It should be noted that a cask is no legal measure but merely a vessel to contain liquid. The firkin, kilderkin, etc. are, strictly speaking, the names given to casks of sufficient size to contain the reputed quantity.

DEFINITION OF WINE AND SPIRIT CASKS

(Colonial Wine and Rum excepted).

	Gallons.		
Half quarter cask	10	and under	20
Quarter cask	20	,, ,,	33
Third cask	33	,, ,,	43
Hogshead	43	,, ,,	66
Pipe, butt or puncheon	66	,, ,,	126
Large casks	126	,, ,,	160
Unsizeable	160	and upwards	

WINE AND SPIRIT CASK STANDARDS

	Gallons.	Litres.
Pipe of Port or Tarragona	115	522.48
,, Madeira	92	418.00
,, Marsala	93	422.54
,, Lisbon	117	531.37
,, Vidona	100	454.4
Butt of Sherry	108	490.68
Puncheon of Brandy	120	545.20
Hogshead of Brandy	60	272.60
,, Geneva	72	327.13
Aum of Hock, etc.	30	136.30
Quarter of Port	28	127.22
Hogshead of Sherry	54	245.34
,, Port	57	258.97
,, Claret and Burgundy	46	209.00
Tonneau of Claret	190	863.25
Barrique of Claret (Bordeaux)	49	225.00
Quarter of Sherry	27	122.67
,, Brandy	30	136.30
Puncheon of Rum (varies)	93	422.54
Butt of Whisky	108	490.68
Hogshead of Whisky	55	249.89
Quarter Cask of Whisky	28	127.22
Octavo of Whisky	15	68.15

APPROXIMATE WEIGHT AND MEASUREMENT OF WHISKY CASKS AND CASES

		Measurement.	Weight) (approx.		
			c.	q.	lb
1 dozen		⅓ cubic foot		1	22
Butt	108 gallons	33 cubic feet	10	3	0
Hogshead	65 ,,	20 ,, ,,	6	2	0
,,	55 ,,	18 ,, ,,	5	2	0
,,	50 ,,	16½ ,, ,,	5	0	0
Quarter	35 ,,	11 ,, ,,	3	2	0
,,	28 ,,	9 ,, ,,	3	0	0
Octavo	15 ,,	5½ ,, ,,	1	3	0
,,	10 ,,	3½ ,, ,,	1	1	0

CHAMPAGNE, APPROXIMATE WEIGHT OF CASE

	Bottle		½ Bottle	
	q.	lb.	q.	lb.
Gross weight	2	12	2	21
Nett Weight Liquid	0	21	0	21
,, Liquid and Bottle	1	23	2	4

Outside measurements 21″ × 16″ × 9″ = 1.75 cu. ft.
Half bottle 23″ × 15″ × 10″ = 2. cu. ft.

GRAIN MEASURES

All kinds of grain are measured by what is known as "dry measure." Dry measure is identical with the fluid measure of capacity; but obviously requires much larger units and consequently we obtain the following table:

DRY MEASURE.

4 gills = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon
2 gallons = 1 peck
4 pecks = 1 bushel
8 bushels = 1 quarter
36 ,, = 1 chaldron
2 quarts = 1 pottle
2 bushels = 1 strike
4 ,, = 1 coomb
5 quarters = 1 load
10 ,, = 1 last
140 lb. = 1 boll of meal
1 sack = 2 bolls

Locally many commodities commonly measured by weight are measured by the bushel—the following equivalents are important.

Wheat:	English 63 lb. Foreign 62 lb.
Oats:	English 40 and 42 lb Foreign 38 and 40 lb.
Barley:	English 52 and 56 lb. French 52½ lbs. Mediterranean 50 lb
Buckwheat:	52 lb.
Rye and Maize:	60 lb.

In the Baltic a unit known as the "Chetwert" is employed and the capacity of this measure varies with the grain under consideration. The true equivalent of the chetwert in Imperial measure is 5.775 bushels.

A sub unit of the chetwert is the "pood," which is equivalent to 36.113 lb. (av.). Tons, kilos and quarters are also in use; but freight is usually quoted per ton of 62 poods.

1 chetwert Wheat = 10 poods
1 ,, Barley = 8½ ,,
1 ,, Rye = 9 ,,
1 ,, Linseed = 9 ,,
1 ,, Oats = 6 ,,

1000 quarters of Wheat = 1373.476 chetwerts of 10 poods, or 221 tons 8 cwt. 2 qrs. 8 lb. or 224,981.65 kilos.

1000 quarters of Oats = 1476.856 chetwerts of 6 poods, or 142 tons 17 cwt. 0 qr. 16 lb. or 145,149.45 kilos

1000 quarters of Rye = 1476.856 chetwerts of 9 poods, or 214 ton 5 cwt. 2 qrs. 24 lb. or 217,724.18 kilos.

1000 quarters Linseed = 1304.556 chetwerts of 9 poods, or 189 tons 5 cwt. 2 qrs. 24 lb. or 192,323 kilos.

1000 quarters Barley = 1303.108 chetwerts of 8½ poods, or 178 tons 11 cwt. 1 qr. 20 lb. or 181,436.81 kilos.

1000 chetwerts of Wheat = 728.080 quarters, or 161 tons 4 cwt. 1 qr. 12 lb. or 163,804.62 kilos.

1000 chetwerts of Oats = 677.114 quarters, or 96 tons 14 cwt 2 qrs. 13 lb. or 98,282.77 kilos.

1000 chetwerts of Rye = 677.114 quarters, or 145 tons 1 cwt. 3 qrs. 19 lb. or 147,424 16 kilos.

1000 chetwerts of Linseed = 766.544 quarters, or 145 tons 1 cwt. 3 qrs. 19 lb. or 147,424.16 kilos.

1000 chetwerts of Barley = 767.396 quarters, or 137 tons 0 cwt. 2 qrs. 23 lb. or 139,233.93 kilos.

The following weights are generally accepted :—

1 quarter Wheat = 496 lb.
1 ,, Barley = 400 lb.
1 ,, Rye = 480 lb.
1 ,, Linseed = 424 lb.
1 ,, Oats = 320 lb

CHAPTER VIII

STOWAGE CAPACITIES

This chapter contains the weights, measurements and the stowage capacities of the cargoes that are usually carried in vessels under modern conditions.

Cubic measurement enters very largely into the stowage of cargo, and consequently affects the merchant or charterer, as well as the shipowner. If a merchant is chartering a vessel on a " lump sum " basis and has a light cargo to ship, he will naturally wish to charter what is termed a " good cubic " ship ; that is to say a vessel having a large amount of cargo space in comparison to her deadweight. On the other hand the shipowner who has a small cubic capacity ship, naturally desires to fix his vessel for cargo which will enable her to carry her full deadweight. Consequently to know what amount of space any quantity of a commodity will stow in, is frequently of the greatest importance.

For convenience, the standard of 1 ton (2240 lb. avoirdupois) has been adopted. The figures given for the stowage per ton of the commodity refer to the actual stowage in the vessel.

It will be realised by any experienced person that the construction of the vessel, such as the number of pillars or web frames, etc., in a hold, the narrowing of the fore and after holds, or the amount of dunnage that is used, will have a direct bearing on the quantity of cargo that can be carried in any given space. Similar cargoes shipped from the same port at different times of the year will even stow differently.

It should be apparent from these facts that many of the figures given in this chapter must be regarded as an approximation only.

Other factors have also a bearing on the stowage capacities. For example, in the grain trade, experience has shown that the cubic space required for a unit of these cargoes varies very considerably at different ports of shipment, as some grains are heavier, and some lighter, than the same grain from a different country. The weight of grain will also vary with age.

Again, any figures for timber must be accepted as a fair average only. Timber differs very much as regards its weight with the length of seasoning, etc.

In all vessels **good stowage** will help considerably towards reducing the stowage factor of the cargo.

In the figures given for the stowage per ton of a commodity allowance has been made for the small spaces adjacent to barrels, bales and other containers that cannot be actually filled with cargo but, as experience has shown, are required under the usual conditions of stowage.

Where packings, weights or measurements of an article are different for different ports or countries, and consequently give different stowages per ton, these variations—where known to us—are given.

Where from any cause the actual stowage factor per ton is a variable quantity, either the limits are defined or the letter " c " (meaning *about*) has been used to mark this commodity.

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
ACETATE OF LIME	..	..	..	..	..	*See* Lime
ACETONE	..	Drum	..	..	60/65	
ACIDS	Acetic	Barrel	..	..	60	
		Carboy	..	..	70/75	
	Boracic	Barrel	..	..	65/70	*See* Phenol
	Carbolic	..	..	..	..	Crystal
	Citric	Barrel	..	..	70/75	Powdered
					65	
		Kegs	..	..	47/50	
	Cresylic	Barrel	..	..	55/60	
	Muriatic	Carboy	..	..	72/80	
		Case	1¼ cwt.	2′ 2″	40 (c)	2 screw stopper jars of 28 lb. each
	Nitric	Carboy	..	..	60/65	
	Oxalic	Barrel	..	..	60/65	
	Phosphoric	Demijohn	..	..	110/120	
	Salicylic	Barrel	..	..	100/130	
	Stearic	Bag	..	..	50/53	*See* Stearin
	Sulphuric	Case	1½ cwt.	2′ 2″	28	2 screw stopper jars of 42 lb. each
		Drum	55 galls.	..	26/28	
		,,	110 ,,	..	28/32	
		Carboy	..	..	55/60	
	Tartaric	Keg	..	..	40/45	
		Barrel	..	..	60	
AGAR	..	Bale	284 lb.	9′ 8″	76	
ALBUMEN	Blood	Case	..	..	66	
	Egg	,,	250 lb.	6′ 0″ (c)	50/52	
ALCOHOL	Pure	Barrel	..	..	80	
	Methyl	Drum	..	..	60/65	
	Wood	Barrel	..	..	68/75	
ALE	..	Case	..	..	60	Bottled

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
ALLSPICE		Bag	140 lb.	5′ 0″	80	
ALMONDS	Shelled	Bag	..	..	68/70	
		Case	..	..	69	
	Unshelled	Bag	2 cwt.	9′ 0″	90	
		,,	1 ,,	5′ 0″	109	
		Box	25 lb.	..	..	Jordan
ALOES	..	Case	..	..	55/60	
ALUM	Chrome	Cask	..	..	52/53	
	Powdered	,,	..	..	57	
		Barrel	425 lb.	10′ 0″	52/55	
	Lumps	,,	..	..	60	
ALUMINIUM	Ingots	Case	..	..	39/40	
	Sulphate	Barrel	..	..	50/55	Powdered
	,,				63/67	Lump
AMBOYNA WOOD	..	..	..	..	..	*See* Timber
AMMONIA	Anhydrous	Cylinder	..	..	40/45	
	Sulphate, of	Bag	2 cwt.	..	68	
ANILINE	Oil	..	..	..	..	*See* Oils
	Salts	Cask	..	..	90/98	
		Case	..	..	78	
ANISEED		Bag	70 lb.	5′ 0″	120	
	Oil	..	..	..	..	*See* Oil
ANTIMONY	Ore	..	..	..	..	*See* Ore
	Oxide	Cask	..	..	40	
	Regulus	Case	2 cwt.	1′ 4″	12/14	6–9 slabs in case
APPLES	Canned	Case	50 lb.	1′ 3″	57/60	
	Dried	Box	50 ,,	2′ 6″	88/90	American
	Green	Barrel	150 ,,	6′ 6″	90/100	American
	Fresh	Case	40 ,,	1′ 7″	90	Seattle
					85	Argentine
			59 lb.	2′ 0″	75/77	Australia
			59 ,,	2′ 3″	85	,,
		Box	60 ,,	1′ 9″	90/100	Hobart
		Case	52 ,,	2′ 5″	100/105	New Zealand
	Waste	Barrel	200 ,,	9′ 0″	104	
APRICOTS	Canned	Box	..	..	55/60	
	Dried	Case	30 lb.	..	52	
	Pulp	,,	..	..	52	
ARCHIL	Weed	Bale	..	..	80/90	*See* Extracts
ARECA NUT	..	..	..	..	..	*See* Nuts
ARGOLS	..	Cask	..	..	60/65	Italian
		Bag	..	..	42	
ARRACK	..	Cask	..	..	75/80	
	Bottled	Case	..	..	75	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
Arrowroot	..	Bag	..	..	52	
		Box	..	..	70/72	
Arsenic		Bag	..	..	..	
		Barrel	..	..	30/35	
	White	Keg	..	..	27/29	
Artichokes	Canned	Case	1 cwt.	..	55	
Asafoetida	..	Bag	145 lb. (c)	..	50	
		Case	..	..	40/42	
Asbestos	Crude	Bag	100 lb.	1′ 6″	55/56	
	Fibre	,,	..	..	90	Varies
	Millboards	Crate	300 ,, (c)	8′ 4″	50/60	
	Plaster	Case	400 ,, (c)	11′ 5″	58	
	Packing	Truss	220 ,, (c)	3′ 0″	45	
	Sand	..	..	..	38	
	Shingles	Crate	..	..	30	
	Ore	..	..	..	..	*See* Ore
Ash	..	..	..	..	40	*See* Timber
					..	
Ashes	Bone	Cask	..	..	43/53	Varies
Asphalt (Asphaltum)	..	Bulk	..	..	52/55	Mexico
		Barrel	370 lb.	10′ 0″	60/67	
					46	Trinidad
		Bulk	..	..	55/60	Curacao
		Cask	..	..	27/30	
		Bag	..	..	53	
		Drum	..	..	50/55	
Automobiles	..	..	..	..	200/400	Each make varies considerably
Babbits Metal	..	Case	1 cwt.	..	11	
Bacon	..	Case	..	..	65	
Baking Powder	..	Box	..	..	66	
Balata	..	Bag	..	..	42/45	
Ballast	..	..	..	..	..	*See* page 220
Balsa	..	..	..	..	..	*See* Timber
Balsam	Canada	Cask	..	..	50/53	
	Copovi	Keg	..	..	57/60	
	Crude	Case	..	..	56	
Bamboo	Split	Bundle	..	4′ 6″	85	
Bananas	..	Bunch	..	..	128	
		Double Crate	135 lb. (c)	..	108	Las Palmas
		Single ,,	68 lb. (c)	..	123	,, ,,

Commodity.	Description.	Usual Packing.	Gross Weight	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
BARILLA	..	..	..	..	40/42	
BARIUM	Binoxide	Drum	..	..	16	
	Nitrate	Cask	..	..	30/33	
	Sulphate	Barrel	..	..	28	
BARJARI	..	Bag	..	..	55	
BARK	Bona	..	..	..	100	
	Cinchona	Bale	2–2¾ cwt.	..	135/145	Varies considerably
		,,	..	..	75/180	
	Coppice	Bag	..	..	100	Hydraulic pressed
		Hogshead	..	..	80	
	Hemlock	..	..	..	77	
	Mallet	..	..	..	90	
	Mangrove	Bag	180 lb. (c)	..	78/80	
	,,	Bale	..	..	45/55	Hydraulic pressed
	Oak	Bag	..	..	55/60	
BARLEY	..	Bulk	..	..	56/58	American
		Bag	..	..	62/65	African
		,,	1½–1¾ cwt.	..	60	Indian
		Bulk	..	..	58/64	Morocco
		Bag	..	..	55/70	,,
		Bulk	..	..	56	Smyrna
	Heavy	,,	..	..	53	Black Sea
	Light	,,	..	..	56/58	,,
BARYTES	..	Bag	..	..	21/22	
		Barrel	..	..	27	
BASILS	..	Bale	4 cwt.	36′ 0″	180/185	Australasia
		,,	3 ,,	27′ 0″	180/183	,,
		Truss	2 ,,	16′ 0″	160/161	,,
BAST	Bale	..	..	..	120/130	
BAUXITE	..	Bulk	..	..	32	
		Bag	2 cwt.	..	38	
BEANS	..	Bag	..	..	65/67	Africa
		,,	243 lb.	5′ 2″	50	Australia
		,,	203 ,,	5′ 0″	50	New Zealand
		,,	..	..	63	Rangoon
	Black	,,	..	..	50	
	Canned	Case	..	..	52	
	Castor	Bag	..	..	60	
	Cacao	,,	..	..	78	Java
		,,	..	..	77	Brazil
	Haricot	,,	..	..	65/68	
		Bulk	..	..	47/57	
	Horse	Bag	..	..	63	
		Bulk	..	..	53	
					67	Manchuria
					58	Sicily
					53	Vladivostock
	Lima	Bag	..	..	66	
	Locust	Bulk	..	..	80/85	New Crop
	Soya	..	..	..	57	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
BEAVER BOARDS	..	Bale	..	..	60	
		Crate	..	..	77	
BEEF	Boned	Crate	112 lb.	3′ 0″	60	New Zealand
		Bag	120 ,, (c)	5′ 0″	95	,, Vary
		,,	..	..	103	Argentine
	Corned	Case	..	..	50/55	
	Frozen	Quarter	140 lb.	8′ 0″	125/130	New Zealand 16 ccs. = 1 ton
		,,	..	..	112	Argentine
	Chilled	,,	..	..	120	
	Cow	,,	145 lb.	6′ 6″	100	New Zealand
	Ox	,,	180 ,,	7′ 6″	95	,, ,,
	Hind	,,	175 ,,	6′ 3″	80/90	Australia Mixed 81/83
	Crops	,,	120 ,,	3′ 3″	60/75	Australia
	Salt	Barrel	..	..	50	
		Tierce	..	..	55/60	
BEER	..	Hogshead	..	..	60/65	
	Bottled	Case	..	..	50/60	
		Cask	..	..	58/60	
BEESWAX	..	Bag	120 lb.	5′ 6″	100	S. Africa
		Barrel	..	..	68/70	
		Case	..	..	70/90	Varies considerably
BEETS	Fresh	Barrel	..	..	103	
BEETROOT PULP	..	Bag	..	..	205/215	
BENZINE	..	Bulk	..	..	43	
		Case	75 lb.	2′ 0″	53/55	
BENZOL	..	Drum	..	..	53/58	110 gallons
BICARBONATE OF SODA	..	..	..	..	..	*See* Soda
BISCUITS	Light	Case	..	..	80/130	Vary considerably
BITTERWOOD	..	..	..	..	148	Jamaica
BITUMEN	..	Bulk	..	..	48/50	
		Barrel	3½ cwt.	10′ 0″	65	
BLACKLEAD	..	Barrel	..	..	48	
BLACKSHEETS	..	Envelope	10 cwt.	..	20	
		Bundle	2/5 ,,	..	20	
		,,	..	..	10	New York
BLACKWOOD	..	..	..	..	65	*See* Timber
BLEACHING POWDER	..	Drum	..	..	50/60	

	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2440 lb.	Remarks.
BLOOD, DRIED	..	Bag	..	..	85/90	
BLUE	..	Case	56 lb.	2′ 0″	80	
BOLTS & NUTS	..	Bag	1 cwt.	..	35	
		Case	..	..	15/25	
BONE	Dust	Bag	..	..	65	Australian
	Manure	,,	168 lb.	..	53	Best
					72	Common
	Meal	Bag	1½ cwt.	..	45	Piraeus
	,,	,,	2 ,,	..	50	Calcutta
BONES	Calcined	Bulk	..	..	107	
		Barrel	110 cwt.	5′ 6″	110/115	
	Crushed	Bag	..	..	60	
	Loose	..	..	..	85/90	
		Bag	1½ cwt.	5′ 0″	72	Australian
					60	R. Plate
BOOTS	..	..	..	..	..	*See* Footwear
BORATE OF LIME	..	..	..	..	..	*See* Lime
BORAX	..	Bag	..	..	44	
		Barrel	300 lb.	7′ 0″	53	
BOXWOOD	..	..	..	..	..	*See* Timber
BRAID	Hemp	Bale	315 lb. (c)	18′ 6″ (c)	120/130	Manila
	Straw	,,	120 ,, (c)	10′ 0″ (c)	175/200	,,
BRAN	..	Bag	..	..	115/135	American
		,,	180 lb.	7′ 0″	93	Australian
	Compressed	Bale	200 ,,	6′ 0″	80/85	
		Bag	183 ,,	7′ 0″	87	New Zealand
		Bulk	..	..	90	
BRANDY	Bottled	Case	..	..	55/60	
		Cask	3 cwt.	..	80	
	Cherry	,,	75 lb. (c)	2′ 0″ (c)	68	
BRAZIL NUTS	..	..	..	..	..	*See* Nuts
BRAZILWOOD	..	..	..	..	..	*See* Timber
BRICKS	New	Bulk	..	..	20	1000 weigh 3¾ tons (c)
	Old	,,	..	..	20/24	,, 3 tons (c)
		Case	..	..	30/35	
BRIMSTONE	..	..	..	..	..	*See* Sulphur
BRIQUETTES	..	..	..	..	38/42	
BRISTLES	..	Bale	2/3 cwt.	..	..	
		Barrel	..	..	80/95 (c)	
		Case	½/1 cwt.	4′ 5″	60/70	Indian

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
Brooms	..	Case	..	..	230/250	
Buckwheat	..	Bag	160 lb.	..	65/68	
Bulbs	..	..	..	..	82	Holland
		Case	..	..	80 (c)	
		Bag	..	..	80/83 (c)	
	Lamp	..	..	..	300/330	
Burlap	..	Bale	990 lb. (c)	22′ 0″	48/55	Calcutta
Butter	..	Cask	..	..	70	Danish
		Box	68 lb.	1′ 6″	50	Brisbane
		,,	66 ,,	1′ 7″	55	Sydney
		,,	66 ,,	1′ 6″	52/53	New Zealand
		Keg	89 ,,	2′ 1″	70/75	
		Box	..	..	60/66	Argentine
		Tub	..	..	65/75	American
Cable	Chain	..	..	..	..	
	Lead	Reel	..	..	40	
	Electric	Drum	..	..	25/30 (c)	Vary
Cacao		Bag	112/196 lb.	..	85/95 (c)	
		Cask	3/4 cwt.	..	115/125	
	Butter	Case	..	..	50/60	
Caffeine	..	Case	..	..	180	
Calcium	Carbide	Drum	127 lb.	2′ 8″	40	Large
		,,			44	Small
		Case	..	..	41	
	Chloride	Drum	5 cwt.	..	30	
Calico	..	Bale	..	..	90	
Calves	..	Carcase	110 lb.	4′ 6″	92	New Zealand
Camphor	Crude	Tub	..	..	96	
	Refined	Case	1 cwt.	3′ 6″	65/66	China & Japan
		Barrel	..	..	70	
		Case	..	..	52/55	India
Camwood	..	..	..	..	..	*See* Timber
Candied Fruit	..	Case	..	..	81	
Candles	..	Box	63 lb.	1′ 9″	56/64	Vary
Canes	Malacca	..	..	..	120/140	
Canned Goods	Apples	..	..	..	..	*See* Apples
	General	..	..	..	60/70	Vary
	Meats	..	..	..	..	*See* Meats
Canvas	..	Bale	..	..	47 (c)	
		Roll	..	..	50	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No of Cubic Feet requred to Stow 1 ton of 2240 lb.	Remarks.
CAPERS	Pickled	Keg	..	..	70	
CAPSICUM	..	Bale	300 lb.	20′ 0″	145	
CARBON	Black	Case	220/250lb.	..	160/180	
CARBORUNDUM	..	Barrel	..	..	35/40	
	Wheels	Case	..	..	76/82	
CARDAMOMS	..	Bag	130/140lb.	..	..	
		Case	112 lb.	4′ 0″	95	Madras
		Bag	160/170lb.	..	..	
CAROBS	..	Cask	..	..	30/33	
CARPETS	..	Bale	..	..	130/140	
		Roll	..	..	80/85	
		Bale	4/5 cwt.	..	..	Smyrna
CASEIN	..	Sack	160 lb.	5′ 0″	68	New Zealand 14 sacks to 1 ton
		Barrel	..	9′ 0″	65	
CASHEW NUTS	..	..	..	..	..	*See* Nuts
CASINGS		Large Cask	9 cwt.	26′ 0″	59	Australian
		Small ,,	4½ ,,	13′ 0″	60	,,
		Cask	8¾ ,,	32′ 0″	75	New Zealand
		Keg	4¼ ,,	12′ 6″	59	,,
		,,	3½ ,,	13′ 0″	74	,,
CASKS	Empty	..	..	..	..	*See* Empties
CASSAVA	..	..	..	..	..	*See* Tapioca
CASSIA	China	Case	..	..	180	China
		Bundle	..	..	130	,,
	Buds	Case	..	..	125	,,
		Bundle	..	..	130	
CAVIARE	..	Case	75 lb.	1′ 6″	50	Russia
		Keg	..	..	50	
CEMENT	Portland	Cask	400 lb.	6′ 0″	38/43	
		Bag	..	..	35/37	
CHAFF	..	Sack	83 lb.	6′ 4″	170	
CHALK	Common	Bulk	..	..	38	
		Bag	..	..	40	
		Barrel	..	..	42/46	
CHANK	..	..	..	..	115/120	
CHARCOAL	..	Bag	..	..	115	
		Barrel	..	..	125/135	
		Case	..	..	95	
CHASAM	..	Bale	300 lb.	..	90/100	India
CHEESE	..	Box	90/95 lb.	..	68/70	Canadian
		..	156 lb.	5′ 0″	56/76	Brisbane

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Appoximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
Cheese—*Con.*		..	165 ,,	4′ 4″	59	Melbourne
		Crate	147 ,,	4′ 6″	67	New Zealand
			177 ,,	4′ 6″ (c)	59	,,
Cherries	..	Barrel	600 lb. (c)	14′ 0″ (c)	55	Italy
	Canned	Case	..	..	49	
Chicle	..	Bag	..	..	40/50	Columbia
		Box	..	..	50/60	Mexico
Chicory	..	Bag	132 lb.	6′ 0″	60	
Chillies	..	..	..	..	..	Vary considerably
			160 lb.	8′ 0″ (c)	190	Zanzibar
China Clay	..	Bulk	..	..	38/40	
		Bag	..	..	42	
		Cask	..	..	46/50	
China Root	..	..	..	..	..	*See* Roots
Chocolate	Manufactured	Case	..	..	60/65	
Chow Chow	Bottled	Case	77 lb.	1′ 8″	60	
Cider	..	Cask	..	..	66/68	
Cigarettes	..	Case	..	..	140/165	
Cigars	..	,,	..	..	180	
Cinchona	..	..	..	..	..	*See* Bark
Cinnabar	..	..	..	..	..	*See* Ore
Cinnamon	Pressed	Bale	95 lb.	5′ 0″	110	
	Unpressed	,,	..	..	140	
		Roll	100 lb.	4′ 6″	100/130	
		Case	..	..	90/95	
Citrons	..	Barrel	6 cwt.	..	80 (c)	
		Case	300/310	10′ 3″	70/73	
Claret	..	Barrel	..	..	65 (c)	Italian
Clay	Bulk	..	..	..	17/22(c)	
Clover	..	..	..	..	..	*See* Seed
Cloves	..	Bag	..	..	120/125	
		Bale	..	..	125/130	African
		Bundle	165 lb.	..	..	
	Stems	Bag	..	..	132	
Coal	American	Bulk	..	..	42/48	
		Screened	..	..	46	
	Anthracite	Beans	..	..	48	
		Cobbles	..	..	45/48	
		Nuts	..	..	48	
		Large	..	..	40/43	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
Coal—*Con.*		Peas	..	..	48	
		Scotch	..	..	43/45	
	Australian	Newcastle	..	..	43/47	
		Southern	..	..	44/46	
	Durham	Screened	..	..	48	
		Unscreened	..	..	45/47	
	Japan	..	..	..	43/47	
	Midland	Screened	..	..	47/48	Derby, Notts
		,, Gas	..	..	47/50	and York
		Unscreened	..	..	45/47	Hard Stea
	NewZealand	..	..	..	43/47	
	Northumberland	Screened	..	..	47/50	
		Unscreened	..	..	45/47	
	Scotch	Dross	..	..	50	
		Navigation	..	..	43/45	
		Screened	..	..	47/50	
	Welsh	Admiralty	..	..	42/45	Large
		Monmouth	..	..	43/46	Large
		Thro'	..	..	42/44	
		Sized	..	..	48/51	Nuts, etc.
		Small	..	..	40/44	
	Newport News	Gas	..	..	48	
Coal Tar	..	..	..	..	..	*See* Tar
Cobalt	..	..	..	..	..	*See* Ores
Coca	..	Barrel	..	..	70	
Cochineal	..	Bag	200 lb.	..	55/60	
Cocksfoot Seed	..	..	..	..	..	*See* Seed
Cocoa	..	Bag	1¼ cwt.	4′ 4″	90 (c)	
Coconut	With husks	Bulk	..	..	125/150	
		Bag	..	..	145/150	
	Without ,,	Bulk	..	..	100	
		Bag	..	..	105/115	
		Case	..	..	50/60	
	Desiccated	Case	160 lb.	5′ 0″	65/70	
	Beans	..	..	..	..	*See* Beans
	..	Bag	100 lb.	6′ 0″	130	Colombo
	Fibre	Bale	340 ,,	10″ 0″	100/120	Pressed
Coffee	..	Large Cask	13/14 cwt.	..	60	Australian
		Small ,,	5/7 ,,	..	60/65	,,
		Bag	132 lb.	3′ 0″	57/65	Brazil
		Tierce	..	6′ 0″	70	,,
		Bag	168 lb.	..	..	Ceylon
		Cask	..	..	55	,,
		Bag	..	..	58/62	Colombia
		,,			55/70	Costa Rica
		,,			60/65	Guatemala
		,,			70	Java
		,,			62	Venezuela
	Clean	,,	150 lb.	4′ 0″	57	
	Parchment	,,	..	..	80	

Commodity	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2440 lb.	Remarks.
COIR	Fibre	Bale	..	..	200 (c)	
		Bundle	..	..	..	
	Yarn	Dholl	5/7 lb.	..	190	
		Bales	3 cwt.	..	120 (c)	Well pressed
COKE	Durham	Beehive	..	..	86/90	All coke measurements vary according to the amount of moisture in it
	,,	Gas	..	..	78/80	
	,,	Patent	..	..	73/80	
	Scotch	Foundry	..	..	90	
	,,	Furnace	..	..	88/90	
	,,	Gas	..	..	68/70	
	,,	Patent	..	..	78/80	
	Welsh	Foundry	..	..	80	
	,,	Furnace	..	..	76/79	
	,,	Gas	..	..	75/77	
COMBS	Horn	Case	..	..	60/70	
CONCENTRATES	..	Bag	2 cwt.	2′ 0″	20	
	Lead	Bulk	..	..	12	
	Zinc	,,	..	..	18	
CONCRETE	..	..	..	..	18	
CONDENSED MILK	..	Case	56/60 lb.	1′ 2″	45	
CONDUIT PIPES & TUBES	..	..	..	..	60	
CONFECTIONERY	..	..	..	..	63/70 (c)	
COPPER	Bars	Loose & Bundle	..	..	8/10	
	Ingots (Manufact'd)	..	20/60 lb.	..	11	
	Ingots	Barrel	..	..	13/14	
	,,	Loose	..	..	10	
	,,				7	Queensland
	Matte	..	..	..	18	
	Ore	..	..	..	..	*See* Ores
	Refuse	..	..	..	15	
	Sheets	Case	5 cwt.	..	14/18	
	Sulphate	Cask	..	..	45/48	
	Wire	Case	..	..	40	
COPPERAS	..	Cask	..	..	54	
COPRA	..	..	..	..	..	Varies largely
	..	Bag	160 lb.	8′ 0″	90/115	Australian
		Bulk	..	..	75/110	,,
		Case	..	..	80/100	,,
		Bulk	..	..	75	Bombay
	Desiccated	Case	..	..	65 (c)	
					95	Dutch East
					75/80	Malabar
		Bag	140 lb.	5′ 6″	96	New Zealand
		,,	140 ,,	6′ 6″	100/110	Singapore
		,,	140 ,,	..	85	South Sea

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
CORAL	Rough	Bag	..	..	90	
		Box	..	..	70	
CORIANDER	Plant	..	..	..	85	
	Fruits	Bag	160 lb.	..	120/130	
CORK	..	..	..	..	..	Varies largely according to pressing
		..	..	..	250	Algeria
	Board	..	..	..	290/300	
		Bale	..	..	200/400	France
	Granulated	Bag	..	..	210/300	
		Bale				
	Well Pressed	,,	..	..	200	
	Badly ,,	,,	..	..	300/400	
	Scrap	,,	..	..	330/350	
	Shavings	,,	..	..	200/220	
		Bag	..	..	220/240	
					210/230	Spain
	Waste	Bale	..	..	210/220	
	Wood	,,	154 lb.	..	270	
CORN	..	Bag	..	..	55/57	
		Bulk	..	..	48/53	
CORNFLOUR	..	Bag	..	..	55/56	
		Case	..	..	58/60	
CORUNDUM	Lump	Bag	..	..	39/42	Calcutta
COTTON	African	Bale	400 lb.	18′ 0″	100/110	Badly pressed
	American	,,	..	24′/26″	130	Pressed
					200	Unpressed
	Atlantic Ports	,,	480 lb.	19′/20″	100	Well pressed
	Gulf ,,	,,	520 ,,	24′ 0″	100	,,
	Mobile	,,	500 ,,	23′ 0″	55/70	Hard pressed
	New Orleans	,,	482 ,,	34′ 7″	..	
	Texas	,,	515 ,,	31′ 0″	135	
	Australian	,,	500 ,,	35′ 0″	130/150	Pressed
					250	Unpressed
	Brazil	,,	180 ,,	14′ 0″	..	Soft pressed
			460 ,,	10′ 0″	52	Hard pressed
	Calcutta	,,	400 ,,	12′ 0″	52/60	,,
	China	,,	..	..	54	,,
	Egyptian	,,	480 lb.	20′ 0″	58/68	,,
	E. Indies	,,	490 ,,	10′ 0″	54/57	,,
	Madras	,,	400/500lb.	12′ 0″	52/60	,,
	N. Zealand	,,	400 ,,	24′ 0″	134	
	Sea Island	,,	333 ,,	35″ 0″	52	Well pressed
	Sudan	,,	..	..	100	
	Syria	,,	..	..	100/120	
	W. Indies	,,	212 lb.	25 0	55/70	
	Waste	,,	..	..	160/180	
COTTONSEED						Varies considerably
	African	Bulk	..	..	70/95	
	,,	,,				Well ginned
					100/120	Badly ginned

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
Cottonseed—*cont.*	..	Bag	140 lb. (c)	..	68/70	Bombay
		Bulk	..	..	72/80	Calcutta
	Cake	..	..	..	52	
		Bulk	..	..	64/68	Heavy Black Afifi
					70/76	Light Black Sakellarides
		Bag	124 lb.	..	..	Karachi
			165 ,,	..	..	Madras
	Meal	Bag	..	..	55/65	
		Bulk	..	..	100	Turkey. Badly ginned
		Bag	..	..	65/70	
Cowgrass	..	Bag	203 lb.	5′ 0″	52	
Cowries	..	..	..	..	..	*See* Shells
Cranberries	..	Case	133 lb.	6′ 6″	85/90	
Cream of Tartar	..	Barrel	110 ,,	3′ 0″	62	
		Hogshead	1300 ,,	34′ 9″	60/65	
Creosote	..	Bulk	..	..	35/36	S.G. 1.00
					34/35	S.G. 1.05
		Cask	..	..	60/62	
Cubebs	..	..	..	..	85	
Cumin	..	Bag	..	..	70/72	
	Seed	..	..	..	120/130	
Currants	..	Bag	..	..	40	
		Box	..	..	50	
		Cask	..	..	55	
Cutch	..	Bag	..	..	66/68	
		Case	1 cwt.	..	56	Calcutta
Cylinders	Ammonia		265 lbs.	..	66/70	
Dagga	..	Case	165 lb.	..	80/90	S. Africa
Dammar	..	Bag	170 ,,	6′ 0″	..	
		Case	230 ,,	7′ 3″	80/90	
Dates	Dry	Box	68 ,,	..	45/48	
	,,	Fancy ,,	143 ,,	..	88	
	Wet ,, ,,	Bag Basket Case	..	..	40/43	
	Pressed	Basket	..	..	45/46	
Dextrine	..	Bag	..	3′ 4″	50/55	
		Barrel	..	..	65/70	
Dhall	..	Bag	..	..	50/51	
Divi-Divi	..	,,	100 lb. (c)	..	95/115	Indian

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
DUCK	Cotton	Bale	..	..	50/60	Varies according to pressing
	Goods	,,	..	..	46/50	
EARTH	Fuller's	Bulk	..	..	24	
		Bag	140 lb.	4′ 0″	63	
	Loose	..	..	..	24/30	
	Sienna	Bag	..	..	60	
	Umber	Cask	..	..	45	
EARTHENWARE	..	Crate	..	..	..	Vary considerably
		Bulk	..	..	120/125	
	Retorts	Loose	..	..	58	
	Jars	Crate	..	..	47	
	W.C.s, etc.	Loose	..	..	80/87	
EBONY	..	..	..	..	54	
EGGS	..	Crate	71 lb.	2′ 9″	88	Australian
		Case	..	..	105	Danish
		,,	1¾ cwt.	7′ 8″	95	Egyptian 1440 Eggs
		Crate	112 lb.	4′ 6″	140/150	New Zealand
	Yolk	Barrel	..	..	75/80	
EMERY	Stone	Bulk	..	..	20	
		Bag	..	..	20/30	
EMPTIES	..	Hogshead	1 cwt.	..	..	
		Barrel	¾ ,,	..	..	
		Kilderkin	½ ,,	..	..	
		Firkin	¼ ,,	..	..	
		Vinegar Cask	1 ,,	..	..	
		Gas Cylinder	1½ ,,	..	..	
ESPARTO	Algeria	Bale	3 & 4 cwt.	..	110/140(c)	
	Tripoli	,,	..	..	100/130(c)	Pressed, Second quality Grass requires more space
	Tunis	,,	..	..	120/140(c)	
	S. Spain	,,	..	..	130 (c)	
EUCALYPTUS	..	..	..	..	45/50	
EXTRACTS	Archil	Cask	..	..	40/43	
	Bark	Barrel	..	..	50/55	
		Case	..	..	39/40	
	Dyewood	Barrel	..	..	50	
		Case	..	..	40/42	
	Fustic	Barrel	..	..	47/50	
		Case	..	..	38	
	Gambier	,,	..	..	35/40	
	Hemlock	Barrel	..	..	39/42	
	Logwood	,,	..	..	50/60	
		Case	..	..	38/42	
	Malt	Barrel	..	..	75	
	Myrobalan	Bag	1 cwt.	..	..	
		Case	1 ,,	..	..	
	Oak	Barrel	640 lb.	15′ 0″	50/55	Argentine
	Quebracho	Bag	..	..	35/40	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
EXTRACTS—*continued*	Rennet	Cask	..	..	47/50	
	Tan	,,	..	..	48/50	
FARINA	..	Bag	2 cwt	5′ 6″	55/57	
FEATHERS	..	Bale	..	..	200/400	Vary according to pressure
FELSPAR	..	Bag	..	..	30/35	
		Bulk	..	..	30	
FIBRE	Bristle	Bale	..	..	80	
	Coconut	,,	340 lb.	10′ 0″	120	
		Mats	60 lb. (c)	1′ 9″	65/70	
	Kittool	Bale	..	..	90/110	
	Palmyra	,,	1 cwt.	3′ 0″(c)	110	
	Rhea	,,	4 cwt. (c)	..	61	
	Vegetable	,,	..	..	135	
		Case	..	..	70/75	
FIGS	..	Bag	28 lb.	..	51	
		Basket	55 ,,	1′ 0″	45	
		Case	1½ cwt.	..	50	
		Sack	2/4 ,,	..	40/50	Smyrna
FISH	..	Case	..	..	90/95	Vary considerably
	Cod	Barrel	..	..	70/75	
	Cured	,,	..	..	60/70	
	Haddocks	..	..	..	90	
	Manure	Mat bags	..	..	64	
	Maws	..	..	..	100	
	Salted	Barrel	..	..	50	
FLAX	..	..	..	..	..	Varies
	..	Bale	350 lb.	15/16(c)	95/100	African
	Dumped	,,	..	..	82	Australian
	Undumped	,,	..	..	135	,,
	Unpressed	,,	4 cwt.	..	155	Baltic
		Mat	126 lb.	..	..	Dutch
	Ground	Bag	..	..	68	
	Meal	,,	..	..	80	
	Pressed	Bale	380 lb.	18′ 0″	107/110	New York
	Dumped	,,	4 cwt.	24′ 0″	120	New Zealand
	Ramie	,,	..	..	90	
					100/105	Russian
	Seed	..	..	..	52	
	Straw	..	..	..	300/350	
	Waste	..	415 lb.	21′ 0″(c)	115	
FLOUR	..	½ Sack	140 lbs.	3′ 8′	45/50	American
		Bag	50/100 lb.	..	46/47	,,
		Sack	280 lb.	..	54	,,
		Barrel	200 ,,	..	60	,,
		Bag	200 ,,	5′ 0″	55	Australian
		½ Bag	100 ,,	2′ 6″	55	,,
		¼ ,,	50 ,,	1′ 3″	55	,,
		Bag	50 ,,	..	48/53	Canada
		Sack	..	..	55	,,
		Bag	..	..	52/53	Trieste
	..	Bag	130 lb. (c)	..	50	U.K.
		,,	2 cwt.	..	55	
	..	Barrel	2 ,,	..	60	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks
FORMALDEHYDE	..	Cask	..	..	60/65	
		Drum	..	..	55	
FRUITS	Canned	Case	..	..	52	Vary
	Citrus	,,	..	..	68	
	Dried	,,	..	..	50/55	
FUEL	Patent	..	..	..	30/40	
	Ovoids	..	..	..	55	
FUR	..	Bale	..	..	130	
	..	Case	..	..	120	
	Skins	,,	5 cwt.	25′ 0″	100/130	
	Clippings	..	..	..	180/220	
FUSTIC	..	Bag	..	..	90/100	
		Barrel	..	..	60/70	
	Roots, Split	..	..	..	130/140	
	,, Unsplit	..	..	..	150/160	
GALANGAL	..	Bag	113 lb.	7′ 10″	90/95	
		Basket	..	..	120	
GAMBIER	..	Bag	162 lb.	5′ 6″	100/120	Varies
	Java	,,	..	..	80/90	
		Basket	..	..	115/120	
		Case	432 lb.	8′ 0″		
GARLIC	..	,,	..	..	80	
GASOLINE	..	Drum	..	..	60/65	
GELATINE	..	Bag	..	..	70	
GHEE	..	Case	..	..	50/57	
		Half case	..	..	55/58	
GIN	..	Case	56 lb.	..	50/60	Varies
GINGER	..	Bag	100/170lb.	..	90	Indian
	Dried	..	..	..	..	
		Case	..	..	80	
GLASS	Bottle	Crate	..	..	86	
		Case	..	..	45	
	Window	,,	132 lb.	3′ 2″	..	100 sq. feet
	Plate	,,	..	..	42/45	
	Silvered	,,	3½ cwt.	7′ 0″	..	100 sq. feet
GLAXO	Large	,,	72 lb.	2′ 0″	62	New Zealand
	Small	,,	56 ,,	1′ 8″	68	,,
	Tins	,,	61 ,,	2′ 0″	80	,,
GLUCOSE	..	Barrel	670 ,,	13′14″(c)	40/50	
		Case	..	..	40/45	
GLUE	..	Cask	..	..	125	
		Case	..	..	112	
		Pieces	5 cwt.	36′ 0″	144	Lyttelton
				50′ 0″	200	Port Chalmers

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
GLUE—*Con.*	Stock	Bale	600 lb.	30′ 0″	100	
	,,	,,	600 ,,	22′ 0″	..	
	Marine	Keg	125 ,,	3′ 3″	..	
		Tin	60 ,,	0′ 9″	..	
		Bag	1 cwt.	2′ 5″		
GLYCERINE		Drum	..	..	43/46	
		Cask	..	..	46/48	
GOLDSLAG	..	Bag	..	..	12/15	Africa
GRAM	..	,,	1½–2½ cwt.	..	50	Indian
GRANITE	Dressed	Blocks	..	..	16	
		Case	..	..	18	
		Loose	..	..	14/15	
GRAPEFRUIT	..	Crate	..	..	60	
GRAPE JUICE	..	Barrel	..	..	90/100	
GRAPE SYRUP	..	Drum	90 gal.	..	..	S. Africa
GRAPES	..	Cask	..	..	90/94	
GRAPHITE	..	Barrel	..	..	50/55	
	Flake	Case	70 lb.	2′ 1″	43/47	
GRAVEL	..	Bulk	..	..	19/20	
		Coarse	..	..	23	
GREASE	..	Barrel	450 lb.	12′ 0″	65	New York
GRINDSTONES	..	Case	..	..	55/60 (c)	
GROUNDNUTS	..	Bulk	..	..	95	Dakar
					95/102* 98/105*	Fundium Kaolack Rufisque Salum River
					102/110	Yawarra River
					112/118	Gambia River
	Shelled	Bag	2 cwt.	..	60/70	Madras
	Shelled	Bag	140 lb. (c)			China
	Unshelled	,,	¾ cwt.			
GUANO	..	Bulk	..	..	42	
		Bag	..	..	55/57	
GUM	Arabic	,,	400 lb.	8′ 0″	48/55	
	Copal	,,	170 ,,	6′ 0″	..	
		Basket	190 ,,	5′ 9″	..	
		Case	220 ,,	7′ 3″	55/60	
	Dragon	,,	..	..	90	
	Kauri	,,	2½ cwt.	8′ 0″	64	
		Sack	170 lb.	6′ 0″	62/70	
	Kalera	Basket	..	..	60/67	
	Mastic	Case	1 cwt.	..	..	

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* Largest figure, wettest condition of nuts. Smaller figure, driest condition of nuts. Depends on amount of rain absorbed.

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
GUNNIES	..	Bale	..	..	58/64	Vary considerably according to pressing, etc.
GUTTA	..	Basket	..	..	68/75	
		Bag	..	..	80/85	
GUTTA PERCHA	..	Case	250 lb.	7′ 0″	63	
	Compound	Barrel	250/260lb.	10′ 0″		
GYPSUM	..	Bag	..	..	43/47	
HAIR	Angora	Bale	..	..	150/200	
	Curled	,,	..	..	120	
	Dumped	,,	..	..	100	
	Horse	,,	..	..	140/160	Pressed
					350/360	Unpressed
	Human	Case	156 lb.	5′ 6″	80	
	Goat	..	..	..	90	In Grease
	Rabbit	Bale	360 lb.	..	210	
	Vegetable	,,	100 ,	..	160/190	
	Hog & Cattle	Bale	170/180 lb.	25′ 4″		Machine pressed
HAMS	..	Box	..	..	60	
	Smoked	Barrel	..	..	70	
HARES	..	Crate	105 lb.	3′ 4″	71	
HAY	Ord. Pressed	Bale	..	..	200/250	Algeria
	Hyd. ,,	,,	..	..	130/145	
					200	Canadian
		,,	75 lb.	6′ 8″	180/190	New Zealand
	Hyd. ,,	,,	..	..	120/130	
	Ord. ,,	,,	..	..	200	
	Unpressed	,,	105 lb.	32′ 0″	350	
	..				150/160	River Plate
HEMATINE	Crystals	Barrel	..	..	65/75	
HEMP	..	Bale	..	..	90/115	African
		,,	2 cwt.	8′ 0″	80	Australian
	Well pressed	,,	..	..	90	
		,,	400 lb.	..	..	Bombay
		,,	400 ,,	35′ 0″	90	Calcutta
		,,	..	..	120/130	Italian
		,,	280 lb.	10′ 0″	93/98	Manila
	Unpressed	,,	..	..	250/270	Mediterranean
		,,	2 cwt.	10′ 0″	90/100	Mombasa
		,,	4 cwt.	24′ 0″	90/120	New Zealand
					80/120	Russia
	Sisal	,,	380 lb.	18′ 0″	106	
HENBANE	..	,,	..	..	125	
HERBS	Dried	,,	..	..	190 (c)	
HERRINGS	Dry	Case	..	..	90	
	Kippered	Box	..	..	85	
	Salted	Barrel	..	..	45	
	Cured	..	..	9′ 0″	60	
	Tins	Case	..	..	80	
	Wet	Tierce	..	..	45/50	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
Hessian	Jute	Bale	..	..	48/49	Calcutta
Hides	Dry	Loose	33 lb.	1′ 6″	100	Australian
	Wet	Loose	50 ,,	1′ 0″	45	
		Bag	224 ,,	5′ 0″	50	
	Buffalo, dry	Bale	1000 lb.	35′ 0″	110	
		Bundle	450 ,,	10′ 0″	75	
	Dry	Bale	..	..	90	
	Elk	Bundle	300 lb.	15′ 0″	..	
	Horse	..	..	..	40/50	
	Indian	Bale	500/600lb.	..	75/85	
	Pickled	Cask	..	..	67	
	Salted	Bag	2 cwt.	6′ 0″	50/55	
	,, green	Cask	..	..	50/60	
	,, wet	Bundle	½ cwt.	..	46	
	Single	Bag	..	1′ 6″	50	
	..	Barrel	..	..	50	
Hominy	..	Bag	..	..	52/53	
Honey	..	Cask	..	..	44/50	
		Case	112 lb.	2′ 0″	45	New Zealand
Hops	..	..	..	..	..	Varies
		Bag	..	..	230/250	American
		Bale	..	24′ 0″	250/260	New Zealand
Horns and Hoofs	..	,,	4 cwt.	30′ 0″	150	
	Loose	..	..	..	90/95	Vary
		Bag	..	..	100/120	
Horse and Box	..	..	2 tons(c)	..	..	Average
Indigo	Paste	Case	370 lb.	..	67	
		,,	400 ,,	12′ 0″	62/65	
		Chest	200 ,,	..	64	
Iron and Steel	Bars and Bundles	Loose	..	..	20	London
	Bars	,,	..	..	10	
	Bars and Billets	,,	..	..	15/17	New York
	Bundles	,,	..	..	11/15	
	Fish plates	,,	..	..	15	
	Galvanised	Crate	5 cwt.	..	35/36	Corrugated Sheets
		,,	10 ,,	..	30	
		Case	..	..	20	
	Girders	..	..	..	80	
	Hoops, Steel	Bundles	..	..	30	
	Pigs	..	..	..	10/15	
	Pipes	..	..	..	20/30	
	Railway	..	..	..	15	
	Scrap	..	..	..	20/25	
	Shafting	..	..	..	22	
	Sheets	Loose	..	..	15	
Isinglass	..	Case	..	..	90	
		Bale	285 lb.	7′ 6″	90/100	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2440 lb.	Remarks.
IVORY	..	Loose	..	..	28/32	
	Nuts	Bag	1½ cwt.	5′ 0″	65	
	Scrap	Barrel	..	..	70	
	Vegetable	Cask	4 cwt.	9′ 0″	45	*See* Tagua
IXTLE		Bale	..	..	90/110	Mexico
JAGGERY	..	Bag	1½ cwt.	3′ 0″	36/38	
JAMS	..	Case	85 lb.	1′ 9″	50	
JELOTONG	..	,,	350 lb.	10′ 0″	65/70	*See* Gutta
JUNIPER	..	Bag	..	..	80/83	
JUTE	..	Bale	400 lb.	10′ 4″	56/60	Calcutta
	Cuttings	,,	..	..	58/60	
	Butts	,,	400 lb.	8′ 0″	55	
	Waste	,,	600 ,,	50′ 0″	165/180	
KAINITE	..	Bag	204 ,,	4′ 0″	38	
		Bulk	..	..	34/36	
KAOLIN	..	..	..	..	..	*See* China Clay
KAPOK	..	Bale	1½/2½ cwt.	..	130/150	Indian
					115/130	Java
KERNELS	..	..	..	..	..	*See* Ground Nuts
KIDNEYS	..	Crate	..	..	56/57	New Zealand
KIESELGUHR	..	Bag	..	..	50/52	
LAC	Refuse	Bag	147 lb.	6′ 0″	..	
LAMB	Frozen	Carcase	35½ lb.	1′ 9″	110/112	Australian
			40 ,,	2′ 1″	120	New Zealand
LAMPBLACK	..	Cask	..	..	120	
LAPIS LAZULI	..	..	..	..	30	
LARD	..	Box	62 lb.	1′ 5″	55/60	American
		Pail	..	..	70/85	
		Large Cask	7¾ cwt.	26′ 0″	67	New Zealand
		Small ,,	3 ,,	12′ 6″	67	,,
	Tierce	..	400 lb.	11′ 0″	65/70	
LEAD	..	Barrel	..	..	45	Australian
		Bars	..	..	10	
	Silver	..	82½ lb.	..	7/8	
	Pig	..	40 ,,	..	8/12	
	Piping	Cask	5 cwt.	..	12/15	
	Sheets	Roll	10 cwt.	..	15/20	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton. of 2240 lb.	Remarks.
Leather	..	Bale	..	..	90/120	Varies considerably
		Roll	..	..	225	
	Scrap	Bale	..	..	180	
		Case	..	..	200	
	Dressed	,,	2 cwt.	21′ 0″	120/140	
		Bale	150 lb.	27′ 0″	90	Australian
		,,	5 cwt.	24′ 0″	96	New Zealand
		,,	6 ,,	30′ 0″	100	,,
		Truss	4 ,,	28′ 0″	140	
Leaves	Bay	Bale	..	..	130	Varies
	Bucha	,,	..	..	250	
	Cacao	,,	..	..	250	
	Laurel	,,	400 lb.	20′ 0″	220/250	
	Patchouli	,,	400 ,,	20′ 0″	120/150	
	Senna	..	..	..	120/150	
Lemons	..	Case	..	..	85/86 (c)	
Lemon Peel	..	Cask	..	..	65 (c)	
Lentils	..	Bag	..	..	50	
Lignum Vitae	..	..	..	..	..	*See* Timber
Lime	Acetate of	Bag	..	..	80/90	
		Barrel	..	..	90/100	
	Borate of	Bag	150 lb.	..	52/54	
	Chloride of	Cask	..	..	70/75	
		Drum	..	..	55/60	
	Phosphate of	..	..	..	42	
	Sulphite	Barrel	..	..	54	
Linoleum	..	Roll	..	..	65/75	
Linseed	..	..	..	..	66/69	African
					60/65	Australian
					55/60	Bombay
		Bag	164/186lb.	..	57/58	Calcutta
					59/60	Karachi
	Meal	..	..	..	72	
		Bulk	..	..	58	R. Plate
		Bag	..	..	60	
Liqueurs	Bottled	Case	..	..	75/78	
Liquorice	..	Bag	..	..	80	Alexandretta
	Roots	Case	2 cwt.	10′ 0″	85	
		Bag	1 cwt.	..	80/85	Smyrna
Lithopone	..	Barrel	..	..	50/55	
Locust Beans	..	..	..	..	..	*See* Beans
Logwood	..	Bundle	..	..	92/94	
Macaroni	..	Case	..	..	90/100	
Mace	..	,,	1½ cwt.	..	80/90	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
MADDER	..	..	..	..	..	*See* Roots
MAGNESIA	..	..	..	..	..	*See* Ore
MAGNESITE	Lump	Bag	190 lb.	..	28/31	
MAGNESIUM CHLORIDE	..	Barrel	6 cwt.	11′ 0″	..	
		Drum	,,	8′ 2″	35/36	
MAHOGANY	..	..	..	..	..	*See* Timber
MAIZE	..	Bag	..	..	57/60	Africa
		Bulk	..	..	55/57	,,
		,,			48	Black Sea
	Flaked	..	..	..	200	
		Bag	1½–2½ cwt.	..	..	India
		Bulk	..	..	49	R. Plate
		Bag	..	..	50/53	Sulina
MALANGAS	..	Bulk	..	..	47/52	
MALLET BARK	..	..	..	..	..	*See* Bark
MALT	..	Bag	..	..	80/90	
MANDARINES	..	Basket	24 lb.	..	..	
MANGANESE	..	Bag	..	..	45/50	
MANIOC	..	Case	..	..	90/100	
MANURE	Fish	Bag	300 lb.	..	50/52	
	Marl	Bag	..	..	30	
		Bulk	..	..	28	
	Manufactured	Bag	..	..	40/41	
	Phosphate	Sack	2 cwt.	5′ 0″	45/50	
MARBLE	Block	..	..	..	14/17	
		Crate	..	..	19/20	
MARGARINE	..	Box	..	..	70	
		Tub	..	..	75	
MARJORAM	..	Bale	..	..	220/230	
MARL	..	..	..	..	28	
MARROW	..	Large casks	7¾ cwt.	26′ 0″	67	
	..	Small ,,	3¾ cwt.	12′ 6″	68	
MATCHES	Bryant & Mays	Case	..	..	110/120	
	Masters	Case	56 lbs.	1′ 0″		
MATTING	Canton	Roll	..	..	130	
	Cargo	..	..	..	190	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
MEAT	..	Case	..	..	53/56	Argentine
		,,	84 lb.	2′ 0″	55	Australia
			100 ,,	2′ 0″	45/47	New Zealand
			106 ,,	3′ 0″	48	
	Extract	,,	..	..	48/54	
MELONS	..	Box	..	..	80	
METAL (Scrap)	..	..	..	..	..	*See* Iron, Scrap
MICA	..	Bag	..	..	70	
		Case	130 lb.	2′ 3″	60	Indian
		Cask	..	..	60	
		Scrap	..	..	120	
MIDDLINGS	..	Bag	2 cwt.	7′ 0″	65/70	
MILK	Condensed	Case	58 lb.	1′ 5″	40/46	
	Foods	..	2 cwt.	..	80	
	Powdered	..	..	..	150/160	
	Whole	Case	130 lb.	4′ 0″	62	Powder
MOHAIR	Unpressed	Bag	..	..	240/245	Varies
	Pressed	Bale	..	..	110/160	
MOLASCUIT	..	Bag	..	..	89	
		Basket	..	..	88	
MOLASSES	..	Bulk	..	..	26/27	
		Cask	..	..	50/60	
	Solid	Basket	..	..	50	Java
MONEZITE	..	..	..	..	..	*See* Sand
MOTHER OF PEARL	..	..	..	..	..	*See* Shells
MOTOR	Chassis	Case	..	..	250	Vary considerably
	Cycle	,,	..	..	120	
	Tyres	Bale	..	..	130	
		Case	..	..	160	
MOWRA FLOWERS	..	..	..	..	40/42	
MUTTON	..	Carcase	50 lb.	2′ 6″	110	Australian
			60 ,,	2′ 11″	105/110	New Zealand
		Cut	..	..	84	
		Leg	..	..	113	
		Carcase	..	..	115	River Plate
MYROBOLANS	..	Bag	1½ cwt. (c)	3′ 0″	73/77	
		Pocket	½ ,,	..	68/73	
		Extracts	..	..	..	*See* Extracts
NAPHTHA	..	Case	..	..	57	New York
NAPHTHALENE	Flakes	Barrel	..	..	90/95	
	Balls	,,	..	..	80/85	
NITRATE OF SODA	..	..	..	..	..	*See* Soda

Commodity.	Description.	Usual Packing	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
NITRATE OF POTASH	..	..	..	..	..	*See* Saltpetre
NITRO BENZOL	..	Drum	..	..	50	
NUTMEGS	..	Bag	112 lb.	3′ 6″	62/63	
		Case	80 ,,	2′ 6″	60/62	
NUTS	Shelled	..	..	..	70/75	African
	Unshelled	..	..	..	100/120	
	Areca	Bag	100 lb.	2′ 3″	59	
	Brazil	,,	..	..	86	
		Barrel	160 lb.	6′ 6″	90	
	Cashew	..	..	..	75/76	
	Coco	..	..	..	..	*See* Coconut
	Gall	Case	268 lb.	10′ 0″	80/85	
	Goora	..	..	..	..	*See* Kolanut
	Ground	..	..	..	..	*See* Ground-nuts
	Hazel	Bag	1½ cwt.	..	80	
					110/120	Unshelled
	Ivory	,,	..	..	53/62	
	Kola	,,	..	..	60	
	Pistachio	Case	..	..	72/75	
	Shelled	Bag	..	..	65/70	
		Barrel	..	..	80	
	Unshelled	Bag	..	..	80/90	
	Walnuts	Bale	253 lb.	..	180	
		Case	½/1 cwt.	..	70/80	
NUX VOMICA	Calcutta	Bag	54 lb.	1′ 6″	65/70	
		,,	140/180lb.	..	70/75	
OAK	..	..	..	..	..	*See* Timber
OATMEAL	..	Bag	..	..	65/70	
OATS	Heavy Clipped	Bulk	..	..	67	American
	Unclipped	,,	..	..	70	
					70	Australian
	Heavy	,,	..	..	71	Black Sea
	Light	,,	..	..	74	
	Common	,,	..	..	73	
		Bag	1½ cwt.	..	75	Calcutta
		Bulk	..	..	70	
		Bag	190 lb.	6′ 0″	65/70	New Zealand
	Clipped	Bulk	..	..	65/68	River Plate
	Unclipped	,,	..	..	72/75	
	Quaker	Case	84 lb.	3′ 2″	86	
	Rolled	Case	..	..	80/90	
		Sack	..	..	75/80	
	Clipped	Bag	..	..	76	
	Unclipped	,,	..	..	85	
	White	Bulk	..	..	60/62	Bahia Blanca
	Black	,,	..	..	74	
OCHRE	..	Barrel	..	..	60	
		Keg	..	..	50	
OFFAL	..	Bag, c/s	..	..	120/123	Argentine

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
OIL	Almond	Drum	..	..	50/53	
	Aniline	,,	..	..	48	
	Aniseed	,,	70 lb.	5′ 0″	75	
	Bean	Barrel	450 ,,	12′ 0″	60	
		Case	87 ,,	2′ 0″	..	
		Drum	500 ,,	12′ 0″	..	
	Bone	Barrel	..	..	60	
	Brilliant	Case	..	..	58	
		Barrel	450 lb.	12′ 0″	60	
	Camphor	Case	..	..	50	
		Drum	..	..	55	
		..	81/83 lb.	2′ 0″	55/58	2 drums of 4 gall. each
	Case					
	Castor	Barrel	..	..	58	
		Case	..	..	45/50	
	China	..	..	..	55	
	Coconut	Puncheon	4 cwt.	33′ 0″	60/70	
		Cask	..	20′ 0″	60	
	Cod	Cask	..	..	70/73	
	Cod Liver	,,	280 lb.	..	70/72	
	Colza	Barrel	..	..	60	
	Copra	Drum	960 lb.	23′ 0″	54/57	
	Cottonseed	Barrel	..	..	65	
		Case	..	..	50	
	Creosote	Drum	..	..	48	
	Crude	Bulk	..	..	45	
		Barrel	..	..	60	
	Engine	,,	..	..	60	
	Essential	Case	60 lb.	3′ 0″	45/50	
		Drum	..	..	48	
	Fish	Case	400 lb.(c)	10′/11″	52/55	
		Barrel	445 ,,	11′ 0″	58/62	
		Tin	35 ,,	..	55	
	Fuel	Bulk	..	..	39/40	
		Barrel	..	..	60/62	
	Galena	,,	450 lb.	..	59/60	
	Groundnut	,,	350/400lb.	..	..	
		Tin	84 lb.	..	..	
	Lard	Cask	..	..	60/62	
	Linseed	,,	360 lb.	..	61/64	
		,,	560 ,,	15′ 9″	60/62	
		Drum	51 ,,	1′ 10″	55/62	
		Case	..	..	50	
		Cask	8 cwt.	24′ 0″	45/50	
		Barrel	4¼ cwt.	12′ 11″	55	
	Lubricating	Case	..	..	51	
		Cask	..	..	60/62	
	Mineral	Barrel	..	..	59/60	
		Case	..	..	80	
		Drum	..	..	90	
	Mirbane	Case	..	..	85/90/93	
	Neatsfoot	Barrel	460 lb.	..	60	
	Nut	,,	450 lb.	12′ 0″	60	
	Oleo	Cask	4 cwt.	10′ 11″	75	
	Olive	Barrel	..	..	55/60	
	Omega	..	..	..	50	
	Palm	Cask	4 cwt.	..	62	
	Paraffin	Barrel	..	..	55/60	
	Petroleum	Cask	450 lb.	12′ 0″	62/64	
		Bulk	..	..	41	
	Pine	Barrel	430 lb. (c)	10′ 11″		
	Rape	Drum	45 lb.	..	55/60	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
OIL—*Cont.*	Sandalwood	Case	..	..	53/56	
	Seal	Cask	..	..	58/60	
	Soya Bean	Bulk	..	..	40	
		Cask	..	..	47/50	
	Sperm	Barrel	..	..	55	
		Drum	..	..	49	
		Bottle	..	..	96	In baskets
	Thyme	Drum	10 cwt.	26′ 9″	56/58	
	Vegetable	Cask	..	..	66	
	,, Bottled	Case	..	..	75	
	Whale	Barrel	..	..	60	
	Wood	,,	..	..	51/54	
		Case	½/1 cwt.	..	50	
OIL CAKE	..	..	..	..	..	Varies considerably
		Bag	150 lb.	4′ 0″	60	Australian
		Bulk	..	..	53/60	Black Sea
	Castor Seed	..	1½/1¾ cwt.	..	..	
	Coconut	Bag	1/1½ cwt.	..	78/80	
	Cottonseed	,,	2 cwt.	..	50/52	
		Bulk	..	..	75/78	Danube
						Square cakes
		,,	..	..	78/85	Oval cakes
		..	..	..	60	East Indian
	..	Bag	1¾ cwt.	..	50/55	Egyptian
	Linseed	,,	1½/2 cwt.	..	50	
	Groundnut	,,	1½/2½ cwt.	..	..	
		,,	..	..	52/55	Marseilles
	Meal	..	..	..	50/52	
	Mustard Seed	Bag	..	..	85	
	Niger Seed	..	..	..	53	
	Palmist	Bag	..	..	56	
	Peanut	,,	..	..	55	
	Soya Meal	,,	173 lb. (c)	5′9″ (c)	75	
		,,	..	..	45/46	
		Bulk	..	..	50/55	
OLEO	..	Cask	4 cwt.	15′ 0″	65/70	
OLIVES	..	Barrel	3 cwt.	..	65/70	Piraeus
		Case	..	..	60/63	
ONIONS	..	Bag	..	..	78/85	
		Case	..	..	78/80	
		Bag	..	4′ 0″	85/90	Alexandria
OPIUM	..	Chest	208 lb.	8′ 8″	96	
		Case	1¾ cwt.	..	..	Constantinople
ORANGES	..	Box	76 lb.	2′ 9″	85/90	
		,,	¾ cwt.	..	..	Jaffa
ORCHIL	..	Bale	..	..	..	*See* Archil
ORE	Antimony	Bag	132 lb.	..	20	Australia
		Bulk	..	..	30	Africa
	Asbestos	Bag	..	..	60/70	
	Bauxite	Bulk	..	..	27/30	
	Chinese	Case	..	..	10	
	Cinnabar	..	..	..	24	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
Ore—*Cont.*	Chrome	Case	..	..	15/16	
	Cobalt	,,	..	..	18/20	
	Concentrates	Bag	..	..	15/23	
	Copper	Bulk	..	..	15/20	
	Galliver	,,	..	..	12/30	Africa
	Iron	,,	..	..	20/25	Spain
					18/25	
		Cask	5 cwt.	..	35/45 (c)	
	Manganese	Bulk	..	..	17	Bombay
		Bag	..	..	20/22	Poti
					19/21	Vizigapatam
	Nickel	Barrel	..	..	23/25	
	Silver	Bag	100 lb.	..	..	
	Tin	,,	100 ,,	..	20/23	
	Uranium	,,	..	..	19	
	Wolfram	,,	..	..	11/12	
	Zinc	..	..	..	20/24	
Oysters	Canned	Case	..	..	40/45	
Paddy	..	..	..	..	..	*See* Rice
Paints	..	Drum, Tin	..	..	16/19	
		Keg	..	..	20/22	
		Case	..	..	44	Containing tins
	Lead	Tin	..	..	40	
Paper	..	Bale	5/6 cwt.	..	42/48	Pressed
		Case	..	..	50/60	
		Roll	..	..	91/96	Good condition
		Reel	5 cwt.	20′ 0″	68/80	
		Roll	..	..	95/100	Newfoundland
Paraffin	..	..	..	..	..	*See* Oils
Patchouli	..	Bale	400 lb.	20′ 0″	100/130 (c)	
Patent Fuel	..	..	..	..	..	*See* Briquettes
Pears	Canned	Case	58 lb.	1′ 4″	50	
Peas	..	Bag	200 lb.	4′ 7″	50	Australian
		,,	203 ,,	5′ 0″	48/53	New Zealand
		Bulk	..	..	45/50	
Peat	..	..	..	..	35	
Pelts	..	Cask	8¾ cwt.	32′ 0″	67	New Zealand
	Calf	,,	8¼ ,,	26′ 0″	59	,,
		,, Large	13½ ,,	40′ 0″	59	,,
Pepper	..	Bag	..	..	80/82	
Peppermint	..	Bag	80 lb.	3′ 2″	70	
Petroleum	..	Case	..	..	63/64	
Phenol	Crude	Barrel	..	..	50	
	Crystals	Drum	..	..	70	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2440 lb.	Remarks.
Phosphates	Of Lime	Bag	176 lb.	..	42	
	Of Soda	..	..	..	50	
		Bulk	..	..	23/27	N. Africa
		Bag	..	..	45/46	Egypt
	Rock	..	..	..	32	
		Bulk	..	..	32/35	
Phosphorus	..	..	..	..	65	Varies
Pianos	..	Case	5/6 cwt.	55/65	200/220	
Pickets	..	..	..	..	90	
Pigs	..	Carcase	90 lb. (c)	3′ 6″	87	New Zealand
Pimento	..	Bag	..	..	110/130	
Pineapples	Preserved	Case	..	..	60	
Pipes	Cast iron	Large	..	..	85	
		Small	..	..	60	
Pitch	..	Bulk	..	..	44/52	
		Barrel	460 lb.	..	45	
		Bulk	..	..	55/60	Pensacola
Plaster	..	Bag	100 lb.	2′ 0″	35	
		Cask	300 ,,	6′ 0″	40	
Plumbago	..	,,	..	..	47/50	
Plywood	..	..	..	..	..	*See* Timber
Pollards	..	Bag	203 lb.	6′ 6″	64/66	
Poonac	..	..	..	..	..	*See* Oilcake, Coconut
Pork	..	Tierce	..	..	55	*See* also Pigs
Potash	Bichromate of	Cask	..	..	40/45	
	Carbonate of	,,	..	..	..	
	Caustic	Drum	..	..	26/30	
	Chlorate of	Keg	..	..	55	
	Crystals	,,	168 lb.	4′ 0″	55	
Potatoes	..	Sack	200 ,,	6′ 3″	57/65	
		Case	118 ,,	3′ 6″	67	
		Barrel	..	..	75/80	
Poultry	..	..	..	..	80	America
		..	90 lb.	2′ 7″	64	N.Z. 8 geese
			65 ,,	2′ 0″	69	,, 15 fowls or geese
Prunes	Dried	Box	56 lb.	2′0″ (c)	52/53	American
		Cask	..	..	54/56	
Pumicestone	..	..	..	..	..	*See* Stone

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
PYRITES	..	Bulk	..	..	30	
QUEBRACHO	Logs	..	..	..	50/60 70/85	Good cut Bad cut
	Extract	..	..	..	..	*See* Extract
RABBITS	..	Crate	80 lb.	2′ 7″	72/74	New Zealand
		Case	72 ,,	2′ 2″	68/72	Australian
	Canned	..	..	3′ 0″	60	
RABBIT SKINS	..	..	..	..	..	*See* Skins
RAGS	..	Bale	4 cwt.	20′ 0″	150/200	Vary according to pressure
		Bag	6 ,,	..	..	
RAISINS	..	Box	..	..	49/51	
RAMIE	..	..	..	..	..	*See* Flax
REDWOOD	Logs	..	..	..	65/70	Varies considerably
RESIN	..	..	..	..	..	*See* Rosin
RETORTS	Fireclay	Loose	..	..	50/55	
RHUBARB	Canned	Case	..	..	50/55	
	Powdered	Bag	..	..	100/105	
RICE	Clean	,,	170 lb.	3′ 6″	47/48	Burma
	Rough	,,	..	..	51/52	
	Clean	,,	2 cwt. (c)	5′ 0″	45/50	Calcutta
	Coolie	,,	..	..	47/52	
	Half husked	,,	..	..	58	
	Dust	,,	..	..	60/55	
	Meal	,,	..	..	60/63	
	Paddy	,,	..	..	68	
					49	Japan
	Clean	,,	120 lb.	..	51	Saigon
ROOTS	Burdock	,,	..	..	133	
	Canaigre	,,	..	..	140/155	
	China	,,	..	..	95/100	
	Gentian	Bale	..	..	130	
	Ginger	,,	..	..	115/135	
	Liquorice	..	..	..	..	*See* Liquorice
	Madder	Bale	4 cwt.	..	75	
	Orris	Bag	..	..	80	
	Rhubarb	..	..	..	105	
	Sassafras	Bale	..	..	120	
	Seneca	Bag	140 lb.	7′ 4″	125/135	
ROPE	Coir	Coil	..	..	140/160	
	Hemp	,,	..	..	130/140	
	,,	,,			98/108	Tarred
ROSIN	..	Barrel	..	..	60/65	American

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
RUBBER	..	..	..	..	..	Vary considerably
		Case	..	..	85/90	African
		,,	..	..	65/90	Brazil
		,,	175/200lb.	..	..	Burma
		Bag	..	..	68	Calcutta
	Raw	Case	..	..	66/70	India
		,,	..	..	58/60	Java
		Chest	100/200lb.	..	..	Madras
		Case	216 lb.	5′ 2″	55/60	New Zealand
		,,	3½/4½ cwt.	12′ 0″ (c)	70/80	Para
	Scrap	,,	..	..	76	
	Waste	Bag	..	..	140	
	Wet	..	..	..	..	*See* Jelotong
RUM	..	Bottles in case	..	..	65/66	
		Cask	..	..	60	
		Hogshead	..	..	70	
RYE	..	Bulk	..	..	50	America
		Bag	..	..	53/56	
	Light	Bulk	..	..	56	Black Sea
	Heavy	,,	..	..	48	
	..	,,	..	..	54	Trieste
SAFFLOWER	..	Bale	..	..	65/70	
		Case	..	..	58/60	
SAFFRON	..	..	..	..	70/73	
SAGO	..	Bag	..	..	55/56	
		Box	..	..	54/55	
	Flour	Bag	..	..	60	
	Pearl	Bag	1½ cwt.	3′ 0″		
SAL-AMMONIAC	..	Barrel	..	..	70	
SALMON	Canned	Case	..	..	70	
SALT	..	Bulk	..	..	35/40	
		Bag	..	..	40/42	
		Barrel	..	..	52	
SALTS	Epsom	Cask	..	..	60	
		Keg	..	..	55	
SALTPETRE	..	Bag	168/224lb.	..	38	Indian
		Bulk	..	..	35/36	
SAND	..	,,	..	..	20/23	
	Pit	,,	..	..	22	
	River	,,	..	..	19/20	
	Monezite	Bag	1 cwt.	..	..	
SANDALWOOD	..	..	..	..	..	*See* Timber
SANDSTONE	..	..	..	..	14	
SAPANWOOD	..	..	..	..	..	*See* Timber
SARDINES	..	Case	..	..	40/44	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
SCHEELITE	..	Bag	..	1′ 0″	20	Auckland
SCHIST	..	Case	..	..	62/65	
SEEDS	Ajwan	Bag	150 lb.	..	..	
	Aniseed	,,	..	..	120	
	Beni	,,	..	..	52/57	
	Canary	,,	2 cwt.	..	60	
	Caraway	,,	..	..	60/64	
	Carthamas	,,	180 lb.	..	90	
	Castor	,,	1½ cwt.	..	70	Bombay
					75	Saigon
	Celery	,,	..	..	76	
	Clover	,,	150/160lb.	3′ 4″	50/60	
		Sack	203 lb.	5′ 0″	49/52	
	Cocksfoot	..	100 ,,	..	150	Dressed
			80 ,,	..	196	Undressed
	Cotton	..	..	..	..	*See* Cotton-seed
	Cummin	..	..	..	115/130	
	Dari	..	..	..	50	
	Fennel	..	..	..	95/96	
	Flax	..	..	..	54	
	Gingelly	Bag	..	..	65/67	African
	Grass	,,	134 lb.	6′ 0″	52/57	
	Hemp	Bulk	..	..	70	
	Jowari	..	..	..	49/50	
	Linseed	Bulk	..	..	58	R. Plate
		Bag	..	..	60	,,
		Bulk	..	..	57	Calcutta
	Millet	Bag	..	..	45/51	
	Mowrah	,,	1½ cwt.	..	62/65	
	Mustard	..	270 lb.	5′ 6″	65/80	
	Niger	Bag	170/180lb.	..	63	
	Pine	..	..	..	60	
	Poppy	Bag	1½ cwt. (c)	..	70	
	Rape	,,	1½/1¾ cwt.	..	60	
	Sesame	..	1½ cwt.	..	60/68	Indian
	Sunflower	..	..	..	82	Odessa
					84	Trieste
	Surrie	..	..	..	90	
	Teel	..	..	..	60/68	
	Timothy	Bags	..	..	60/110	
	Trefoil	..	..	..	60/65	
SEMOLINA	..	Bag	..	..	59/60	
SENNA	Leaves	Bale	2½/2¾ cwt.	..	130/150	
SHALE	..	..	..	..	50	
SHARPS	..	Bag	203 lb.	6′ 6″	64/65	New Zealand
SHEEPSKINS	..	..	..	..	..	*See* Skins
SHELLAC	..	Bag	160 lb.	6′ 0″	85/90	
		Case	1½/2½ cwt. (c.)	..	86	
SHELLS	Cowrie	,,	55 lb.	..	42/48	
		Bag	80 ,,	..	50/60	

Commodity.	Description.	Usual Packing.	Gross Weight	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
SHELLS—*Cont.*	Mother of Pearl	Bag	..	..	56/60	
		Case	308 lb.	6′ 0″	44/50	
	Oyster	Bag	..	..	65/70	
	Pearl	Case	3 cwt.	8′ 0″	42/50	
	Tortoise	,,	..	..	150/155	
SHINGLE	Ballast	..	..	..	22/23	
SHINGLES	..	..	..	..	..	*See* Timber
SILK	Raw	Bale	160 lb.	..	80/120	Varies
	Floss	,,	..	..	100/120	
	Waste	,,	..	..	110/125	
	Pieces	Case	..	..	110/115	
SISAL	..	..	..	..	..	*See* Hemp
SKINS	Calf	Cask	1000 lb.	35′ 0″	65/70	
		Case	..	..	90/100	
		Bale	..	..	175	
	Goat	,,	270 lb.	..	100/105	
		,,	350 ,,	16′/20′	80/90	
	Kangaroo	,,	4/8 cwt.	24′/30′	..	
	Opossum	Box	..	32′ 0″	240	New Zealand
	Pickled	Cask	500/600 lb.	..	..	
	Rabbit	Bale	4 cwt.	32′ 0″	240	Australian
		,,	3 ,,	36′ 0″	240	New Zealand pressed
		Box	..	32′ 0″	240	
	Seal	Case	..	..	90/100	
	Sheep	Bale	..	..	120/140	African
		,,	6/7 cwt.	35′ 0″	100	Australian
		,,	3¾ cwt.	20′ 0″	80/100	N.Z. Dumped
				28′ 0″	150	,, Undumped
		,,	..	..	85/90	Argentine
					95/110	Uruguay
					85	Pressed
SLAG	..	Bag	..	..	30	
SLATES	Roof	Case	..	..	24/26	
	Loose	..	..	..	13/17	
	Slabs	Case	6 cwt.	6′ 0″	..	
SLEEPERS	Ash & Oak	..	..	..	73/75	
	Hardwood	..	..	..	50/55	
	Iron	..	..	..	37/39	
	Redwood	..	..	..	65	4″ × 9″
	,,	..	..	..	58	5″ 10″
	Steel	..	..	..	22/25	
	,,	..	..	..	38	
SOAP	..	Barrel	2 cwt.	8′ 4″	80/90	
		Box	..	..	46	
	Toilet	Case	..	..	70/80	
SODA	Acetate	Barrel	..	..	42/45	
	Ash	Bag	..	..	40/45	
	Bicarbonate	Barrel	..	..	45/50	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
	Bichromate	Keg		..	54/60	
		Barrel	..	..	46/47	
	Bisulphate	,,	..	..	45/48	
	Caustic	Drum	760 lb.	8′ 8″	27/30	
	Chlorate	Keg	..	..	55/60	
	Crystals	,,	1 cwt.	4′ 1″	55/60	
	Nitrate of	Bag	..	..	35/37	
		Barrel	..	..	43/44	
	Prussiate of	,,	..	..	65	
	Silicate	,,	..	..	46/48	
SOYA BEANS	..	..	..	..	..	*See* Beans
SPELTER	Ingots	..	..	..	8/10	
SPERMACETI	..	Box	..	..	8/10	
SPONGES	Pressed	Bale	..	..	150/180	
STARCH	..	Bag	..	..	70/73	
		Case	..	..	70/80	
		Cask	..	..	80/90	

STAVES. *Pipe*—length 4½ feet.
Extra Heavy—7 to 8 tons per gross mille (1200 pieces) 5½ feet each.
Heavy—6 to 7 ditto.
Light—5 to 6 ditto.

Hogshead—length 3½ feet.
Extra Heavy—5 to 6 tons per gross mille (1200 pieces) 5½ feet each.
Heavy—4 to 5 ditto.
Light—3½ to 4 ditto.

Barrel—length 32 inches.
Extra Heavy—4 tons per gross mille (1200 pieces) 5½ feet each.
Heavy—2 to 4 ditto.
Light—2 to 3 ditto.

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
STEARIN	..	Bag	..	..	50/53	
		Cask	470 lb. (c)	..	62/65	R. Plate
STEEL	..	..	..	..	..	*See* Iron and Steel
STONE	Bath	..	..	..	17	
		Barrel	..	..	35/40	
		Bulk	..	..	12/17	
	Caen	..	..	..	17	
	Craigleith	..	..	..	16	
	Crushed	..	..	..	22/24	
	Free	..	..	..	16	
	Lime	..	..	..	14	
	Portland	..	..	..	17	
	Pumice	Bag	..	..	110/120	
		Barrel	..	..	175	
		Case	..	..	48/50	Ground
STRAW	..	Bale	65 lb.	5′ 7″	192	
STRAWBERRIES	Canned	Case	..	..	50	
STRAWBOARDS	..	Bundle	56 lb.	..	45/55	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
STRAWBRAID	..	Bale	156 lb.	18′ 0″	260	
SUGAR	Brown	..	..	..	40/42	Africa
	White	..	..	..	44/45	,,
	Yellow	..	..	..	41/42	,,
	..	Bag	..	..	46/49	Alexandria
	..	Pocket	100 lb.	..	..	American
	..		1¾ cwt.	..	..	
	..	Bag	..	3′ 3″	44/46	Australian
	Beet, raw	,,	..	..	60/65	
	..	,,	160 lb.	..	..	Brazil. Stockinette & linen
	Brown	,,	..	..	48	St. John. Brilliant golden
	..	,,	..	..	46/47	St. John. Old-fashioned
	..	Barrel	..	...	50/52	
					37/40	Calcutta
	Candy	Case	..	..	50/55	
	Cane	Bags	..	..	50/52	Cairns
	Castor	Bag	2 cwt.	4′ 0″	40/45	
		,,	3 cwt.	..	42/47	Cuba
	Cube	Case	133 lb.	4′ 0″	50	
	..	Bag	250 ,,	..	..	Demerara
	..				47/49	Egyptian
	Granulated	Barrel	350 lb.	9′ 2″	57/62	
		Bag	100 ,,	..	42/43	
	Grape	Box	..	..	44/47	
		Bag	..	..	50/55	
	Jaggery	...	..	..	..	*See* Jaggery
	..	Bag	240 lb. (c.)	..	48/52	Java. Refined
		Basket	..	..	63	
	Loaf	Barrel	..	..	70/75	
	Maple	Bag	..	..	50	
	..	,,	1¾ cwt.	..	38/43	Mauritius. Also in double mats
						Low sugar
	..	Pocket	100 lb.	..	..	Natal
	..	Bag	2 cwt.	..	..	Peruvian
	..	,,	..	..	40/43	Philippines Dry
	..	,,	..	..	35/38	Philippines Wet
	Raw	,,	..	..	45/46	
		Basket	..	..	55	
	Refined	Bag	..	..	48	
	..		2½ cwt.	..	..	San Domingo
	..		2–2¼ cwt.	..	..	W. Indies
	Ordinary	Box	..	..	45/46	
		Cask	..	..	60/62	
		Hogshead	..	..	54/55	
		Bag	2 cwt	..	39/43	
	..	,,	2 cwt.	..	..	Venezuela Also rush mat
SULPHATE	Copper	Cask	..	..	50	
	Soda	..	..	..	62	
SULPHUR		Bulk	..	..	35/40	Rough
		Bag	..	4′ 8″	42/43	
		Case	..	..	40/42	
		Keg	..	..	60	

All beet sugar is packed in gunny or hessian bags of 2 cwt. each. Except where mentioned, all cane sugar is carried in 2 cwt. bags.

Commodity	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
SULTANAS	..	Box	30 lb.	0′ 8″	..	
SUMAC	..	..	..	..	70/75	
SUNDRIES	Frozen	Bag	120 lb.	4′ 4″	105	Australian
SUPERPHOSPHATES	..	..	..	..	38	
SWEETBREADS	..	Box	..	..	51/52	New Zealand
SYRUP	..	Barrel	..	..	50	
		Hogshead	..	..	44	
TAGUA	..	Bag	1½–2 cwt.	..	55/60	
TALC	..	,,	..	3′ 5″	35/40	
	..	Cask	..	..	60	
TALLOW	..	LargeCask	12 cwt.	40′ 0″	70/80	Australian
		Cask	10 ,,	30′ 0″	70	,,
		Med. Cask	7¾ cwt.	26′ 0″	70	,,
		Small ,,	3 ,,	12′ 6″	67/70	,,
		Large ,,	8 ,,	32′ 0″	80	New Zealand
		Small ,,	4 ,,	16′ 0″	80	,,
		Barrel	..	..	58	,,
		Hogshead	..	..	70	,,
		Tierce	..	..	65/68	
		Tierce	4 cwt.	..	75/80	R. Plate
TAMARINDS	..	Case	..	..	45/47	
		Cask	..	..	53/55	
		Keg	..	..	50	
TANNIN	..	Bag	..	..	50/55	
TAPIOCA	..	,,	..	..	45/50	
		Case	..		57	
	Flake	Bag	180 lb.	5′ 0″	..	
	Flour	,,	200 ,,	4′ 0″	60	
	Pearl	,,	160 ,,	5′ 0″	..	
TAR	..	Barrel	..	..	54/57	
	Coal	Cask	1/5 cwt.	..	47/50	
	Stockholm	Barrel	..	..	54/55	
TARES	..	Bag	..	..	50/52	
		Bulk	..	..	48	
TEA	..	Chest	..	..	90/95	African
		,,	100 lb.	..	100	Ceylon
			,,	..	100	China
		Half chest	65 ,,	3′ 3″ (c)	110	China
		Case	..	..	88	Java
		..	..	..	96/103	Ceylon
		..	..	..	90	Japanese
THYME	..	Bale	200 (c)	..	140	
TILES	Fireclay	Crate	..	..	50	
	Roofing	,,	..	..	80	
	..	,,	1/2 cwt.	..	35	
	..	Loose	..	..	70/80	
		,,			75/78	Marseilles
TIMBER	Amboyna	..	..	..	48/50	
	Ash	..	..	..	39	
	Battens	..	..	..	50	

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2440 lb.	Remarks.
TIMBER—*Cont.*	Beech	..	..	..	51	
	Birch	Boards	..	..	62/65	
		Deals	..	..	..	1 standard = 230 c/f = 4¼ tons
		Logs	..	..	80	
	Blackwood	..	..	..	65/67	
	Boxwood	..	..	..	65/70	
	Brazilwood	..	..	..	89/90	
	Camwood	..	..	..	80/81	
	Cedar	..	..	..	80	Pencil Slabs
	Cedar Slats	..	..	..	70/80	
	Cordwood	..	..	..	..	
	Deals	..	..	..	50	1.44 tons (c) = 1 mille
	Douglas Fir	..	..	..	60	
	Ebony	..	..	..	30	
	Elm	..	..	..	60/65	
	Fir	..	..	..	65	
	Flooring	..	..	..	75	Boards
	Granadella	..	..	..	48/50	
	Greenheart	..	..	..	34	
	Jarrah	..	..	..	30	1 standard weighs 5 tons (c)
	Kauri	Pine	33½ cwt.	..		29 cwt. per 1000 sup. ft
	Larch	..	..	..	80	
	Lignum Vitæ	..	..	..	35/43	
	Lime	..	..	..	59	
	Mahogany	..	..	..	35/40	
	Maple	Bulk	..	..	47	
		Blocks	..	..	70	
		Squares	..	..	70	
	Oak	..	..	..	35/38	Green
		Bulk	..	..	60/62	
		Logs	..	..	48/50	
		Planks	..	..	40	
	Okume	..	..	..	100	
	Quebracho	..	..	..	..	*See* Quebracho

PACIFIC LUMBER	*Cubic Feet to 1 Mille.*		
	Special Lumber ship	*Good Lumber Carrier.*	*Ordinary ship*
Japan	103/107	115/120	120/125
China	100	110/115	115/120
Australia	100	112/114	115/120
Africa	100	114	115/120
East Coast U.S.A.	99/100	112/114	115/18

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2440 lb.	Remarks.
	Pine	..	..	..	55/60	
	Pitchpine	D.B.B.	..	..	65/70	4 tons (c.) to a standard
	Pitprops	..	..	..	..	Varies according to time in water. 1 fathom = 250 c/f = 2¾/3¼ tons

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
TIMBER—*Cont.*	Plywood	Bale	2/3 cwt. (av.)		70/80	
	Pulpboard	..	..	..	100	
	Red Pine	..	..	..	63/65	
	Rimu	..	..	..	..	42 cwt. per 1000 sup. ft.
	Sawnwood	D.B.B.	..	..	85/90	260/280 c/f per standard
		Planed Boards	..	..	..	200c/f
		Rough ,,	..	..	..	210/225 ,,
		Slatings	..	..	..	230 ,,
		Laths	..	..	..	250/260 ,,
	Shingles	..	..	..	70/80	Green
					140/150	Dry
	Shooks	Bundle	..	..	80/90	100 shingles 10 c/f
	,, Tea	..	..	..	67	
	Sleepers	..	..	..	..	*See* Sleepers
	Spokes	..	..	..	70	
	Spoolwood	..	..	..	..	230 c/f per standard
	Spruce deals	..	..	..	80/90	1 standard = 220 c/f = 2¾ tons
	Sycamore	Logs	..	..	53(c)	
	Teak	..	..	..	40/45	African
					40	Indian
	Walnut	Logs	..	..	33	
		Dried	..	..	52/56	
	Yellow Pine	..	..	..	78	

DECK TIMBER A standard of deck timber should stow in 20 per cent. to 25 per cent. less space than the below deck, according to the clearness of deck space. All timber measurements must be considered very approximate. *See* also page 235.

TIN	..	Block	..	..	7/8	
		Box	..	..	10/11	
		Cask	5 cwt.	"5′ 4″	..	
	Ingots	Loose	..	..	9/10	
		Plates	Case	..	20/25	
		Slab	100 lb.	0′ 4″	..	
TINCAL	..	..	..	..	42	
TOBACCO	..	Bale	3 cwt.	14′ 3″	90/95	African
		Barrel	..	..	150/160	Cuban
		Hogshead	1300 lb.	72′ 0″	150/160	American
		Case	245 ,,	4′ 5″	50	Manufactured
			580 ,,	25 0	120	Unm'n'fact'rd
		..			74	Japan
		Bale	1/1¼ cwt.	..	150	Turkish
		Case	..	..	105/120	
TOMATOES	..	Case	80/90 lb.	..	70/75	
	Canary Is.	,,	..	..	..	4 small c/s of 15 lb. (*c*)
	Paste	..	..	..	63/65	
TONGUES	Canned	Case	100 lb.	2′ 5″	50/52½	
	..	Bale	2/5 cwt.	..	..	Indian
	..	Bundle	¼/2 cwt.	..	..	
TOW	..	Bale	220 lb.	15′ 0″	150	Africa

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
Tow—*Cont.*	Dumped	Bale	5 cwt.	40′ 0″	160/180	N. Z. 3 bales in dump
	,,	,,		30′ 0″	160/180	
TRAGACANTH	..	Case	2 cwt.	..	..	Smyrna
TREACLE	..	Cask	..	..	45/48	
TREFOIL	..	Bag	..	..	..	*See* Seed
TUBES	Mannesmann	..	..	..	75/80	
	Steel	Loose	..	..	70(av.)	
	Water & Gas	Bundle	..	..	40	
		Loose	..	..	40	
TUNGSTEN	Concentrates	Bag	½/1 lb.	..	..	
TURMERIC	..	,,	1½ (c)	..	65/75	Indian
TURPENTINE	..	Barrel	2–2½ cwt.	..	60	
		Drum	..	..	56	
TWINE	..	Bundle	..	..	80/90	
VALONIA	..	Bulk	..	..	90	
		Bag	1¼ cwt.	..	92/95	
VANILLA	..	Case	..	..	55/60	
VARNISH	..	Barrel	..	..	58/60	
		Case	..	..	52/55	
		Drum	..	..	50/55	
VERDIGRIS	..	Barrel	..	..	58/60	
VERMICELLI	..	Case	40 lb.	1′ 10″	110	
VINEGAR	..	Cask	6 cwt.	..	70/80	
		Case	1 cwt.	2′ 0″	55/60	
VITRIOL	..	Carboy	..	..	110	
	Blue	Cask	..	..	54	
WASTE	Cotton	Bale	500 lb.	37′ 0″	170	American
	,,	,,		..	100	,, pressed
	Wool	..	..	..	75	
WATER	Fresh	..	..	..	36	
	Salt	..	..	..	35	
WAX	Africa	Bag	140 lb.	8′ 0″	..	
	Beeswax	,,	1¼/1½ cwt.	..	..	
	Carnabau	,,	..	..	65/68	
	Japan	Case	1 cwt.	..	63	
	Paraffin	Barrel	280 lb.	10′ 0″	70	American
		Bag	120 lb.	2′ 9″	55/65	
			114 lb.	3″ 0″	46	
	Refined	,,	2 cwt.	..	..	Double bags
	Scale	Barrel	..	..	70/80	
WHEAT	..	Bag	..	..	53	American
		Bulk	..	..	46/48	,,
		,,	..	..	43/45	No. 1 Northern
		,,	..	..	46/49	E. Coast U.S.A.
		,,	..	..	47/50	New Orleans. Soft winter
		Bag	..	..	52	Australian
	Heavy	Bulk	..	..	45/49	Australia
	Light	Bulk	..	..	45	Black Sea
	Heavy	,,	..	..	42	,, ,,
		,,	..	..	47	Calcutta
		Bag	..	..	46	Leningrad

Commodity.	Description.	Usual Packing.	Gross Weight.	Cubic Measurement per Package.	Approximate No. of Cubic Feet required to Stow 1 ton of 2240 lb.	Remarks.
WHEAT—*Cont.*		Bulk	..	..	45	Leningrad
		,,			45/47	Montreal
		Bag	203 lb.	5′ 0″	51/53	New Zealand
		Bulk	..	..	44/45	Vancouver
		,,	..	..		,, No. 3
		,,	..	..	45/46	,, ,, 4
		,,	..	..	46/47	,, ,, 5
		,,	..	..	48/49	,, ,, 6
		,,	..	..	45/50	Bahia Blanca
WHISKY	..	Cask	..	..	71	
		Case	..	..	56/58	
WHITENING	..	Cask	..	..	39	
WINE	..	Barrel	..	..	85	Italian
		,,	6 cwt.	..	80/85	
		Puncheon	..	40′ 0″	55/57	
		Hogshead	..	29′ 0″	..	
		Case	..	13′ 0″	48/55	
		Drum	12 cwt.	..	..	
	Lees	Bag	216 lb.	..	78	
WIRE	Barbed	Reel	112 ,,	..	44	
	Bright	Bundle	½/1 cwt.	..	80	
	Nails	Keg	1 cwt.	..	..	
	Netting	Roll	½ cwt.	1′ 4″	70	
	Rope	Reel	..	..	38/40	
	Steel	Case	..	..	30	
WOOD	..	..	..	..	..	*See* Timber
WOOD PULP	..	..	..	..	..	Varies.
	Canada	Bale	360 lb. (c)	..	55/58	Wet mechanical
	Sweden	,,	..	..	45/53	,,
					50/55	Sulphide Dry
WOOL	Pressed, scoured	Bale	400 lb.	40′ 0″	220/250	Africa
	,, ,, greasy	,,	..	..	190/200	,,
	Pressed	,,	..	..	180	Alexandria
		Bundle	8/10 cwt.	39′ 0″	..	Argentine
	Scoured, dumped	Bale	250 lb.	20′ 0″	160/180	Australian
	Greasy ,,	,,	340 ,,	..	110/130	,,
	,, un ,,	..	..	..	240	,,
		Bale	3¾ cwt.	..	..	Indian
	Half pressed & corded	,,	..	..	200	Mediterranean
	Greasy, dumped	,,	3½ cwt.	20′ 0″	110	New Zealand
	,, un ,,	,,	3½ ,,	30′ 0″	170	
	Scoured, ,,	,,	2½ ,,	17′ 0″	135	
	,, un ,,	,,	2½ ,,	30′ 0″	240	
		,,	..	..	160	
		,,	930 lb.	..	39/40	R. Plate
	Unpressed	,,	176 ,,	..	210	Spanish
	Pressed	..	..	..	120/130	
	Waste	Bale	..	..	80/100	
	Oxide	Barrel	..	..	65/70	
ZINC	Dust	Keg	..	..	23/24	
	Rolled	Drum	4 cwt.	4′ 6″	..	
	Sheets	Cask	5 cwt.	..	..	
	Spelter	..	..	..	8	

CHAPTER IX

BOARD OF TRADE EXAMINATION REGULATIONS

QUESTIONS FOR THE EXAMINATIONS

Note to Board of Trade Candidates.

THE syllabus laid down by the Board of Trade is comprehensive and must be clearly understood. It will be realised that the candidate is better served if he knows more than he is required to.

By consulting the following syllabus the candidate may pick out the requirements for his grade of certificate.

Bear in mind especially that the **examinations in this subject are now both written and oral.**

Any Cargo Officer, no matter what Certificate he possesses, should read the whole of this book.

The requirements of the Board of Trade in the syllabus of the new examinations are as follows :

Second Mate (Foreign Going.)

The stowage and dunnaging of different varieties of cargoes including bulk cargoes. Elementary ideas on the making and use of cargo plans.

The preparation for stowage, breaking out and discharge of cargo.

Rigging a ship for loading and discharging cargo, and the use of derricks and winches. Strength of cargo gear.

Calculation of capacities taken up by part cargo and of space remaining. Conversion of weight measurement of cargo into space measurement and vice versa.

First Mate (Foreign Going.)

(The candidate should, where possible, illustrate his answers from his own experience).

Stowage of cargo. General stowage of bag cargoes, bales, casks, etc.

Bulk Stowage. Partition and shifting boards. Coilings and dunnage. Deck stowage. Possible damage and its avoidance. Good and bad stowage. Special cargoes, explosives, grain, timber, oil in bulk, steel rails, etc.

Given a cargo list, to stow a hold or holds, making a rough cargo plan, with a view to stability of tender and stiff ships, damage and contamination, easy handling and possible optional ports of discharge.

Methods of ventilation of cargoes. Drainage of holds. Closing of hatches. Cargo locking gear—derricks and winches.

Organisation of cargo work.

Master (Foreign Going.)

An elementary knowledge of refrigeration on board ship. Types of refrigeration on board ship and employed in special cases. Stowage and general handling of refrigerated cargoes.

Mate (Home Trade.)

Same as Mate (Foreign Going.)

Master (Home Trade.)

Understanding of effect produced by filling and emptying ballast tanks, and loading and unloading cargo on the centre of gravity of the ship as a whole : the damage of free liquid surface in tanks and holds.

CARGO QUESTIONS

The following are likely B.O.T. examination questions which candidates for every grade should be able to answer.

No specific answers are given, but a reference is made **to the page of the book** where the requisite information will be found.

Experience is a vital factor for good Stowage, and if anything is not thoroughly understood, consult your superior officers for further information.

QUESTIONS FOR SECOND MATE AND MATE

1. What comprises Dunnage and what is it used for? *See pp.* 34-36.

2. How could you separate several different shipments of iron? *See p.* 71.

3. What is meant by "portmarking" cargo and how would you do this? *See p.* 14.

4. How would you stow Acids? *See p.* 105.

5. Is there any difference between the stowage required for Casings and Casein? *See p.* 50.

6. How would you stow barrels? *See pp.* 21-28.

7. State briefly the points you would observe in the stowage of any cargo. *See pp.* 13-15.

8. What are Essential Oils? Do they require any special care? *See pp.* 143-144.

9. What is "Broken Stowage" and where does this occur? *See p.* 33.

10. With a cargo of coal, what would you take special note of continuously during the voyage? *See p.* 114.

11. Does Asafœtida require any special precautions? *See p.* 41.

12. What is meant by the "sandwich" method of stowing a bag cargo? *See p.* 17.

13. How is turpentine usually carried? State any precautions required. *See p.* 146.

14. How would you sling and stow cases of glass; and in what part of the ship? *See pp.* 20 *and* 66.

15. State fully how a full cargo of rice is stowed? *See p.* 158.

16. What is a Hydrometer, and what is its use?

17. What dunnage would you require with a coal cargo? *See p.* 114.

18. How many tarpaulins would you use on a hatch to make a vessel seaworthy?

Never less than two, three if possible.

19. State how you would stow bale goods, and what precautions you would observe in so doing. *See p.* 29.

20. What are quoins used for? *See p.* 23.

21. Loading a barrel cargo, if you found a damaged barrel after you had blocked off the ground tier, how would you remove it?

Either with can hooks; or parbuckle it out.

22. Would you stow hides in the same hold as foodstuffs? *See p.* 70.

23. In what direction should 'tween deck dunnage be laid? *See p.* 36.

24. How would you stow Canned Goods? *See p.* 49.

25. Describe what precautions you would take if discharging a Heavy Weight at an anchorage. *See p.* 132.

26. State what you know of a Copra cargo. *See p.* 56.

27. If you have a hold with dimensions 40′ x 30′ x 15′ how many tons of New Zealand Greasy dumped wool could you stow?

163 *tons.*

28. What is Special Cargo and what care does it require?

Cargo upon which a special rate is paid, and which is usually carried in a lock-up. See also p. 150.

29. What are bulk cargoes? Give instances of some you have carried. *See p.* 15.

30. What is meant by "overcarried" cargo and how can this be avoided?

Overcarried cargo is that taken on past its proper port of discharge. It can be avoided by careful stowage and good cargo plans.

31. How would you measure up the space remaining in a hold? *See p.* 222.

32. Draw a sketch of a barrel and name the parts. *See p.* 22.

33. What is meant by "blocking off" cargo, and how is this done? *See p.* 10 *and others.*

34. When stowing barrels "bilge and cantline," on how many barrels does the upper one rest? *See pp.* 21-28.

35. When loading grain in bulk, why is it most important to see this is well-trimmed right up to the deck between the beams? *See p.* 129.

36. With any heavy cargo, how do you know when a vessel has her complete cargo?

By the draught marks, with allowances, if any.

37. Write an Essay on "Cargo Damage." Give instances of occurrences in your own experience. *See p.* 210.

38. Would you give any special attention to a cargo of Sugar? *See p.* 163.

39. What is the penalty for carrying cargo in the crew space? *See p.* 12.

40. What is the difference between stowing Hydrochloric Acid and Tartaric Acid? *See p.* 105-111.

41. When carrying a full cargo of fruit, what is the most important consideration? *See pp.* 122-127.

42. State what you know of the carriage of Deck Cargoes. What is the special feature to be careful about? *See p.* 116.

43. With a bag cargo of grain, if on discharging you find many empty bags, would you allow these to be destroyed?

No; it is important to deliver the Bill of Lading number of bags—full or empty.

44. When carrying bananas, would you think it advisable to have a good air circulation or not? *See p.* 125.

45. What is meant by the "angle of repose" of grain? *See p.* 128.

The angle that grain in bulk lies at.

46. What are separation cloths and how would you lay these? *See p.* 130.

47. What is the difference between: (*a*) Corrosive Acids? (*b*) Poisonous Acids? (*c*) Harmless Acids? Give instances of each. *See p.* 106.

48. How would you load timber from a timber raft in a tideway? What precautions would you take? *See p.* 174.

N.B.—*Raise the forward end first to let the tide run beneath the log.*

49. Prepare to take in cargo. State what you would see to regarding hatches, winches, derricks, etc.

50. State briefly how you would stow timber in a full cargo. *See p.* 164.

51. Name the different kinds of wax carried as cargo and how they are stowed. *See p.* 102.

52. What is the difference between a Carboy and a Demijohn? *See p.* 31.

53. Loading barrels at night, how would you tell if the bungs were up?

The rivets in the hoops should be in line with the bung.

54. What precaution must be taken when loading a full cargo of sawn timber? *See p.* 164.

55. How would you load explosives? *See p.* 177 *onwards.*

56. With a heavy cargo why is it required to raise the weight in the vessel?

To keep the stability to a reasonable amount and thus reduce the motion.

57. How should a magazine be constructed? *See p.* 177 *onwards.*

58. What preparations are required before a bulk cargo of grain can be loaded. *See p.* 128 *onwards.*

59. Where would you load spirits?

In a lock-up compartment.

60. How would you sling a barrel with the head out?

On end.

61. What are shifting boards, feeders and shores? *See p.* 128 *onwards.*

62. What is meant by "nesting" cargo? *See p.* 85.

63. What is the difference between Pillage and Ullage? *See p.* 12.

64. Explain the meaning of the following :—

(*a*) Board foot.
(*b*) Freight carcase.
(*c*) Superficial foot.
(*d*) Mille.
(*e*) Petrograd Standard.
(*f*) Short ton.

See Weights and Measures, p. 226 *onwards.*

65. What is Optional Cargo? *See p.* 14.

66. Is there any difference between ventilating a Coal cargo and a Rice cargo? *See pp.* 114 *and* 158.

67. Explain the uses of a Cargo Plan. *See p.* 221.

68. What is ballast and what materials are used for this? *See p.* 220.

69. If, during loading operations, the vessel developed a list, how could you tell the amount?

By the Clinometer.

70. Before filling ballast tanks, what would you be careful of?

To see the filling pipes open.

71. What is meant by the expression "use no hooks" printed on bale goods. *See pp.* 29-30.

72. Having finished loading cargo, prepare the vessel for sea.

73. Describe the requirements for the stowage of a cargo of Jute. *See p.* 133.

74. Write what you know about Oil cargoes generally. *See p.* 134 *onwards.*

75. Give some instances of Dangerous cargoes and how you would stow the articles. *See p.* 177 *onwards.*

QUESTIONS FOR MASTER

The answers to the following questions will be ascertained on pp. 151-158.

1. What is refrigerated cargo? What commodities are carried in this manner?

2. What are the two ways of utilising cold for refrigeration purposes at sea for cargo carrying?

3. When carrying a "frozen" cargo should the ventilators be plugged or not?

4. In a frozen cargo would you allow an air space around the cargo or not?

5. Loading bagged beef, what would you be careful to see to?

6. How would you stow mutton and lamb ?

7. Stowing mutton and beef together, which would you stow below the other ?

8. State what you know about the carriage of apples in cold storage.

9. If carrying cheese is a confined space, what would you be careful of ?

10. Would you stow eggs and apples together ?

11. Should crates of cheese be stowed fore and aft or athwartships ?

12. State what you know about the carriage of bananas in cold storage.

13. If stowing a lower hold full of butter in boxes for six different ports, how would you portmark them ?

14. How is beef carried in a chilled condition ?

15. How could you tell during the voyage that a frozen cargo was keeping in good condition ?

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